

E-2320 C (SE)



System Manual

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Preface

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Notice

Although every attempt has been made to achieve technical accuracy in this document, we assume no responsibility for errors that may be found. Our goal is to provide you with the most accurate and usable documentation possible; if you discover errors, please let us know.

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Trademarks

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FCC notice (display)

This equipment has been tested and found to comply with the limits of 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 is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian notice

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

FCC Compliance Information (display controller)

CLASS B:

This Barco Graphics Controller complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
1. this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

The use of shielded cables for connection of the monitor to the graphics card is required to ensure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by Barco could void the user's authority to operate this equipment.

Environmental information

Disposal Information

This product consists of devices that may contain mercury, which must be recycled or disposed of in accordance with local, state, or country laws. (Within this system, the backlight lamps in the monitor display contain mercury.)

This equipment has required the extraction and use of natural resources for its production. It may contain hazardous substances for health and environment.

In order to avoid the dissemination of those substances in the environment and to diminish the pressure on natural resources, we encourage you to use the appropriate take-back systems.

Those systems will reuse or recycle most of the materials of your end-of-life equipment in a sound way.



The crossed-out wheeled bin symbol invites you to use those systems.

■ If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administrator.

You can also contact us for more information on the environmental performances of our products.

Information for China ROHS compliance

Table of toxic and hazardous substances/elements and their content, as required by China's management methods for controlling pollution by electronic information products

| Part Name | Toxic or hazardous Substances and Elements | | | | | |
|--|--|----|----|------|-----|------|
| | Pb | Hg | Cd | Cr6+ | PBB | PBDE |
| Metal parts | X | 0 | 0 | 0 | 0 | 0 |
| Plastic parts | X | 0 | 0 | 0 | 0 | 0 |
| PCB or PCBA | X | 0 | 0 | 0 | 0 | 0 |
| LCD panel | X | X | 0 | 0 | 0 | 0 |
| Power supply/adapter | X | 0 | 0 | 0 | 0 | 0 |
| Power cable | X | 0 | 0 | 0 | 0 | 0 |
| Connectors and cables | X | 0 | 0 | 0 | 0 | 0 |
| <p>0: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.</p> <p>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 SJ/T11363-2006</p> | | | | | | |

中国大陆 RoHS

根据中国大陆
《电子信息产品污染控制管理办法》(也称为中国大陆RoHS)
，以下部份列出了本产品中可能包含的有毒有害物质或元素
的名称和含量。

本表适用的产品

液晶显示器

有毒有害物质或元素

| LCD Monitor | | | | | | |
|-------------|-----------|--------|--------|---------------|---------------|-----------------|
| 零部件名称 | 有毒有害物质或元素 | | | | | |
| | 铅 (Pb) | 汞 (Hg) | 镉 (Cd) | 六价铬 (Cr6+) | 多溴联苯 (PBB) | 多溴二苯醚 (PBDE) |
| 金属机构件 | X | ○ | ○ | ○ | ○ | ○ |
| 塑料机构件 | X | ○ | ○ | ○ | ○ | ○ |
| 电路板组件* | X | ○ | ○ | ○ | ○ | ○ |
| 液晶面板 | X | X | ○ | ○ | ○ | ○ |
| 电源模块/ 适配器 | X | ○ | ○ | ○ | ○ | ○ |
| 电源线 | X | ○ | ○ | ○ | ○ | ○ |
| 外部信号连接线 | X | ○ | ○ | ○ | ○ | ○ |
| 喇叭 | X | ○ | ○ | ○ | ○ | ○ |

*：电路板组件包括印刷电路板及其构成的零部件，如电阻、电容、集成电路、连接器等

○：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《电子信息产品中有毒有害物质的限量要求标准》规定的限量要求以下

×：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《电子信息产品中有毒有害物质的限量要求标准》规定的限量要求；

但是上表中打“×”的部件，其含量超出是因为目前业界还没有成熟的可替代的技术

Safety Instructions

General Recommendations

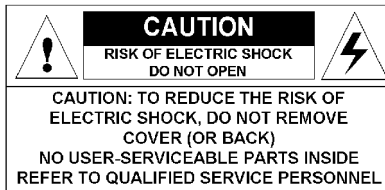
Read the safety and operating instructions before operating the display.

Retain safety and operating instructions for future reference.

Adhere to all warnings on the display and in the operating instructions manual.

Follow all instructions for operation and use.

Electrical shock



Type of protection (electrical):

Class I equipment

Degree of safety (flammable anesthetic mixture):

Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

Power connection

- Power requirements: The display must be powered using the 12 VDC power supply that is supplied with the display.
- The 12 VDC power supply must be powered by the AC mains voltage.
- Power cords:

Power cord with CEE 7 plug: The colors of the mains lead are colored in accordance with the following code: Green-and-yellow: Earth (safety earth), Blue: Neutral, Brown: Line



Power cord with ANSI 73.11 plug: The wires of the power cord are colored in accordance with the following code: Green/yellow: ground, White: neutral, Black: line (live)



- Do not overload wall outlets and extension cords as this may result in fire or electric shock.
- Mains lead protection (U.S.: Power cord): Power cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs and receptacles.

Water and moisture

Never expose the display to rain or moisture.

Never use the display near water - e.g. near a bathtub, washbasin, swimming pool, kitchen sink, laundry tub or in a wet basement.

Ventilation

Do not cover or block the ventilation openings in the cover of the set. When installing the display in a cupboard or another closed location, heed the necessary space between the set and the sides of the cupboard.

Installation

Place the display on a flat, solid and stable surface that can bear the weight of at least 3 displays. If you use an unstable cart or stand, the display may fall, causing serious injury to a child or adult, and serious damage to the equipment.

More warnings in the Installation chapter.

Operating precautions

Continuous operation of the display with the same image may result in some image sticking on the LCD panel. Over 10 hours operation with the same image content is not recommended.

Switching on DPMS on display and PC and activating a good screen saver may decrease the risk of image sticking (image retention).

This apparatus conforms to:

CE (LVD 73/23/EEC), IEC 60950-1, UL 60950-1,
CAN/CSA C22.2 No. 60950-1 (c-UL), EN 60950-1 DEMKO,
CCC GB4943-1995

National Scandinavian Deviations for Cl. 1.7.2 :

Finland: "Laitte on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan"

Norway: "Apparatet må tilkoples jordet stikkontakt"

Sweden: "Apparaten skall anslutas till jordat uttag"

Explanation of symbols

Symbols on the display and / or power supply

On the display or power supply, you may find the following symbols:



Indicates the display is approved according to the CE regulations



or



Indicates the display is approved according to the UL regulations



or



Indicates the display is approved according to the c-UL regulations



Indicates the display is approved according to the DEMKO regulations



Indicates the display is approved according to the CCC regulations



Indicates the USB connectors on the display



Indicates this apparatus must not be thrown in the trash but must be recycled, according to the European WEEE (Waste Electrical and Electronic Equipment) directive

Symbols used throughout the manual:



Warning



Caution



Important notice or
remark



Note



Hint, tip



Additional
information

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Introduction

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Overview

Thank you for choosing Barco.

Single display or complete system?

This manual describes installation and usage of the display only. However, if you have purchased a complete system, the packaging contains the additional sources of information:

- display controller quick install card
- display controller manual on the driver CD-ROM

E-2320 C display

The E-2320 C is a **20.1-inch** color LCD display with a native resolution of **1600x1200**.

Its high-brightness, combined with image crispness and excellent viewing angle, makes it an ideal solution for a multitude of medical applications and environments.

Long-term stabilization

The display contains a Backlight Output Stabilization system (BLOS[®]), which continuously stabilizes the luminance output of the LCD's backlight. This improves the overall optical efficiency and provides long-term image confidence.

QAWeb Agent

In Nio systems, the display comes standard with QAWeb Agent, a user-friendly software tool for QA control.

Power saving

The display is equipped with a power saving system. When left idle for a certain time, the computer connected to the display, will power down the display.

The power saving system can be switched on or off using the on-screen menus. Barco recommends to let the power saving system switched on to prevent image sticking.

Tilt & swivel base

The versatile tilt & swivel foot allows to use the display for viewing portrait or landscape image resolutions.

The user can easily change the panel height and viewing angle, allowing to use the display in the optimal viewing conditions.

Package contents

System package

In case you have purchased a complete system, the system contains one or more display boxes (see below) and a system accessory box containing the following items:

- Display controller(s)
- Display controller quick install card
- Driver CD-ROM containing drivers and display controller manual

Display box

Each display box includes one display and a display accessory box containing the following items:

- Plastic cover of the tilt & swivel foot
- Power supply
- Digital video (DVI) cable (25-pins)
- Analog video (VGA) cable (15-pins)
- USB cable
- Two velcro strips to bind the cables
- European power cord
- UK power cord
- American power cord
- Chinese power cord
- This manual
- Quick install card

If some of the items are missing, please contact the reseller from whom you have purchased the unit.

Parts, controls and connectors

Front

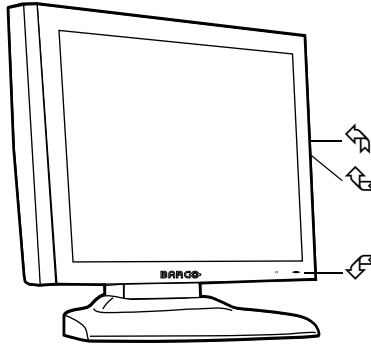


Figure 1

1. Control wheel

The control wheel can be pressed like a push button and rotated like a knob.

It allows to put the display in stand-by, navigate through the on-screen display (OSD) menus and change values in the OSD.

2. USB downstream port. See also item "6." on page 27

3. Power LED

The LED is **off** when the display is disconnected from the power. The LED is also off when the LED function is disabled in the on-screen display (OSD).

The LED is **green** when the display is on (when enabled in the on-screen menus).

The LED is **orange** when the display is in Stand-by power-saving mode.

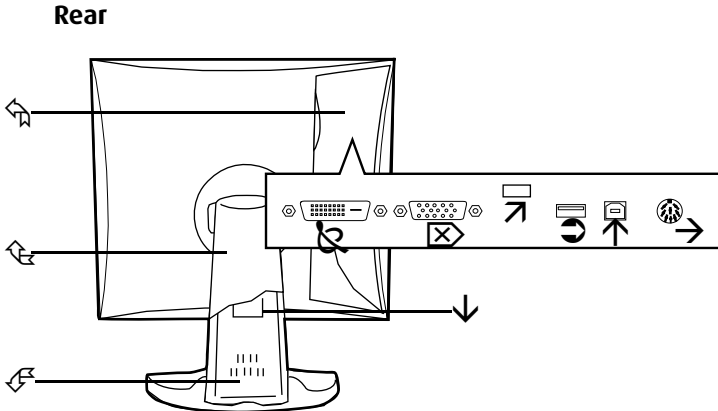


Figure 2

1. Connector compartment cover

To get access to the connectors, remove the cover by pulling down the 2 clips at the top of the cover.

2. Tilt & swivel foot cover

This cover is packed in a separate box when the display is shipped to the customer.

3. Tilt & swivel foot

4. DVI (digital) video input

5. D-Sub 15 (VGA) video input

6. USB downstream port

USB 1.1 standard is supported.

When the display is connected to the PC USB bus, you can connect USB devices, such as keyboard, mouse, digital camera, to this connector.

7. USB upstream port

USB 1.1 standard is supported.

Connect this connector to the PC USB bus if you wish to connect USB devices to the display's USB downstream port.

8. DC power input

Connect the external power supply, delivered with the display, to this connector.



Use supplied power supply only.

9. Tilt & swivel foot clip

The display is shipped with this clip in the foot to protect the tilt & swivel mechanism during transport. After unpacking, you should remove this clip.

Do not throw the clip away! Should the display have to be packed and shipped later, the clip must be applied to the foot again.

10. Slot for security cable (e.g., Kensington lock)

Installation

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Installation precautions



Precautions

- Keep your original packaging. It is designed for this display and is the ideal protection during transport.
- Avoid reflections in the flat panel to reduce eye strain.
- Make sure the surface, stand, arm or boom to bear the display is strong and stable enough to bear its weight.
- Keep the display away from heat sources and provide enough ventilation around the display.
- Do not use the display in direct sunlight.
- To avoid permanent damage, do not scratch or apply pressure to the LCD panel or front filter if present.

Installing your Barco display controller

This chapter will guide you through the physical installation of the display controller(s) for your BARCO Display System.



CAUTION – Wear a grounded, protective ESD strap when handling or during installation of the display controller. Electrostatic charges can damage the display controller.

Overview

Prior to installing the display controller(s) for your BARCO Display System in your PC please take a few minutes to familiarize yourself with both the display controller(s) and the PCIe slots in your computer.

Types of display controllers for Nio Display Systems

There are four different models of display controllers available for your BARCO NIO Display System.

| Board Model | VGA Jumper | Recommended PCIe Slot |
|-----------------------|-------------------|------------------------------|
| BARCO NIO MXRT 2100 | No | x16 |
| BARCO NIO MXRT 5100 | No | x16 |
| BARCO NIO MXRT 7100 | No | x16 |
| BARCOMED CORONIS PCIe | Yes | x8 |

If you are using the BARCOMED CORONIS PCIe display controller, you will need to decide if you are going to use its on-board VGA capabilities. If you are, check the setting of the Jumper at J-1 on the display controller (see figure 3). By default, VGA should be enabled, on the top two pins. To disable the on-board VGA capabilities of you BARCOMED CORONIS PCIe display controller move the jumper so that it is on the middle and bottom pins.

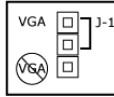


Figure 3: BARCOMED CORONIS PCIe display controller VGA Jumper, VGA enabled

Note: To use multiple BARCOMED CORONIS PCIe display controllers in a single host, you need to enable VGA on only ONE of the BARCOMED CORONIS PCIe display controllers and disable VGA on ALL the other BarcoMed display controllers. To use a BARCOMED CORONIS PCIe display controller with a third party VGA controller or with one or more BARCO NIO MXRT display controllers, do **NOT** enable VGA on the BARCOMED CORONIS PCIe display controller.

Which PCIe slot to use

The table on the preceding page lists the different model display controller(s) available for your BARCO NIO Display System and the recommended PCIe slot to use for optimum performance. Figure 4 shows the three different types of PCIe slots.

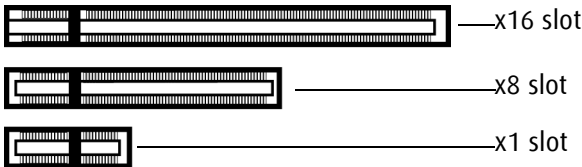


Figure 4: Examples of PCIe slots

Quick installation

Experienced users and system administrators can follow these brief instructions for installing the display controller(s) for your BARCO Display System in the shortest possible time.

To perform a quick installation



CAUTION – Wear a **grounded**, protective ESD strap when handling or during installation of the display controller. Electrostatic charges can damage the display controller.

1. If you are not going to use your old graphics card, uninstall the drivers and software for it if you have not already done so.

Note: If you are using a motherboard containing an on-board graphics solution and do not intend to use it as part of a multiple-display setup, disable it either in the computer's System Set-up utility (BIOS) or the Windows device manager.

2. Shut down and disconnect your computer system.
3. If necessary, remove any previously installed graphics card.
4. Install the display controller(s) for your BARCO Display System.
5. Reassemble and connect your computer system.
6. Install the drivers, QAWeb software and documentation for your BARCO NIO Display System by following the instructions in the section "**Installing drivers and software**" on page 49 of this manual.

Detailed installation

The following instructions will take you step by step through the installation of the display controller(s) for your BARCO Display System.



CAUTION – Wear a grounded, protective ESD strap when handling or during installation of the display controller. Electrostatic charges can damage the display controller.

1. If you are not going to use your old graphics card, uninstall the drivers and software for it if you have not already done so.
2. Turn off the computer, display(s), and other peripheral devices.

3. Unplug the computer's power cord and disconnect all cables from the back of your computer.



Caution – Wait approximately 20 seconds after unplugging the power cord before disconnecting a peripheral or removing a component from the motherboard to avoid possible damage to the motherboard.

4. Remove the computer cover.

If necessary, consult your computer's manual for help in removing the cover.

5. If necessary, unscrew or unfasten and remove any existing graphics card from your computer.

Note: If you are using a motherboard containing an on-board graphics solution and do not intend to use it as part of a multiple-display setup, disable it either in the computer's System Set-up utility (BIOS) or the Windows device manager.

6. Locate the appropriate slot and, if necessary, remove the metal back-plate cover(s).
7. Align the display controller(s) for your BARCO Display System with the slot(s) and press it(them) in firmly until the card(s) is(are) fully seated.
8. **Note:** This step applies only to the MXRT 5100 and MXRT 7100.

Connect the power cable to the 6-pin power connection on the graphics card. Make sure the cables are not interfering with anything inside the computer (for example, a cooling fan).

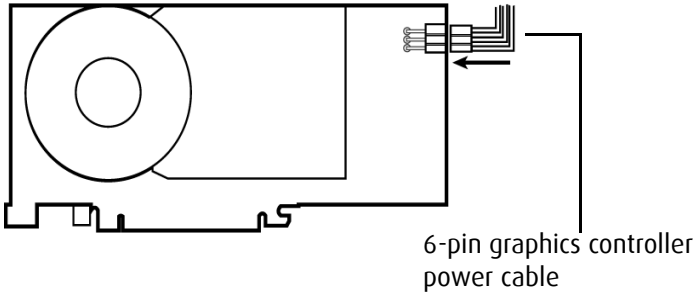


Figure 5: Power connection for the MXRT 5100 and 7100 controllers

9. Screw in or fasten the display controller securely. Replace and secure the computer cover.
10. Connect your BARCO E-2320 C Displays to the display controller(s) for your BARCO Display System using the cables supplied. Make sure all cables are securely connected before turning on your system. Figures 6 and 7 show the types of connections are available:

Connecting your Barco displays

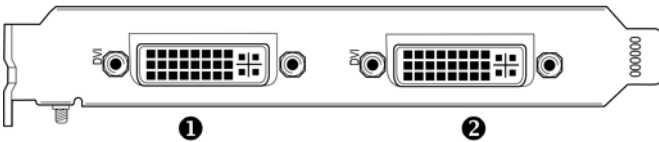


Figure 6:

MXRT 2100 & BARCOMED CORONIS PCIe display controller Baseplate

-
- | | |
|----------|---------------------------|
| 1 | Head 1 – DVI-I Connection |
|----------|---------------------------|
-
- | | |
|----------|---------------------------|
| 2 | Head 2 – DVI-I Connection |
|----------|---------------------------|
-

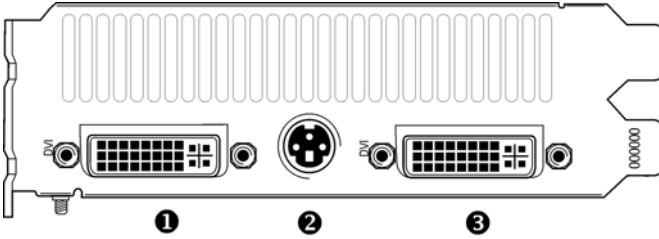


Figure 7:

MXRT 5100 and MXRT 7100 Baseplate

① Head 1 – DVI-I Connection

② Stereographics Connection

Note: This option is not supported in Nio Systems.

③ Head 2 – DVI-I Connection

11. Reconnect any cables you have disconnected and plug in the computer's power cord.
12. Turn on the display(s) and then your computer.

Turning on your system



WARNING - Turn on your display(s) before you turn on your computer. Failure to do so could damage your display(s).

If you have properly installed your graphics card, the Windows start-up messages will appear once the boot procedure is finished.



Your Barco display(s) will be running in a basic video mode at a default refresh rate. Higher resolutions and refresh rates, such as 1536x2048@60Hz, are not available at this stage of the installation. Once you have installed the BARCO NIO Display System drivers and software, the Barco monitor Plug and Play software should automatically set the resolution for the displays of your BARCO E-2320 C Display.

- 13.** Install the drivers, QAWeb software and documentation for your BARCO NIO Display System by following the instructions in the section **“Installing drivers and software”** on page 49 of this manual.

Display installation

After unpacking the display



Important:

In the factory, the height-positioning system in the display foot is blocked with a red clip to prevent damage during transportation.

Before installing the display, you must remove this clip.

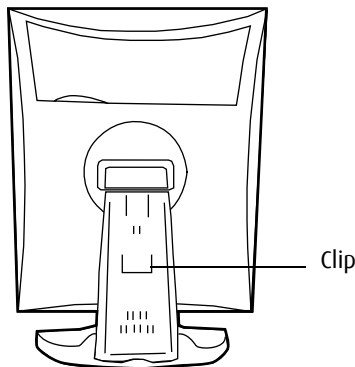


Figure 8


To remove the clip:

1. Position the display with its rear side facing you.
2. Pull the red clip out of the fixation holes in the foot.
3. Keep the clip in case the display needs to be shipped later.

Adjust the panel orientation

You can change the orientation of the panel at any time, but it is more convenient to select landscape or portrait orientation before connecting the cables.

To change the panel orientation:

1. Stand at the front side of the panel and take the panel at both sides.
2.  Very important: Tilt the panel before changing the orientation.

Should you change the panel orientation without tilting it first, you might irreversibly damage the tilt & swivel mechanism.

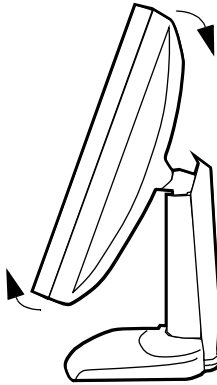


Figure 9

3. To change from landscape to portrait, turn the panel clockwise.

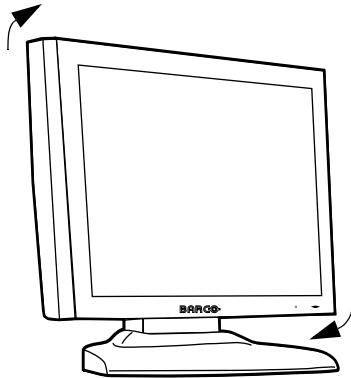


Figure 10

4. To change from portrait to landscape, turn the panel counterclockwise.

Power connection

To connect the power:

1. To get access to the connectors, remove the connector compartment cover by pulling down the 2 clips at the top of the cover.
2. Connect the output of the supplied 12V DC power supply to the DC input of the display.

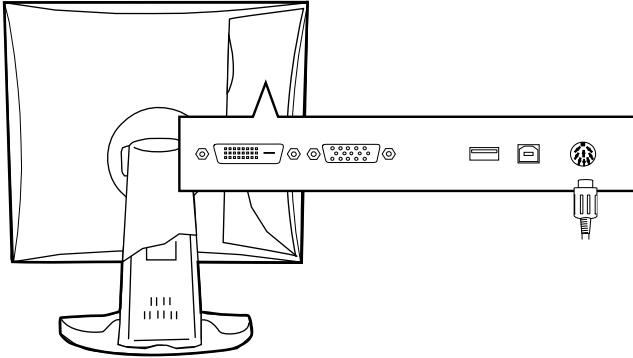


Figure 11

3. Connect one end of the proper power cable to the AC input of the 12V DC power supply.

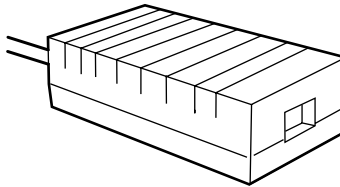


Figure 12

4. Connect the other end of the power cord to a **grounded** power outlet.

We recommend to use an additional surge protector between the power supply unit and the power outlet to protect the equipment against sudden power variations.

Video connection

The display has 2 different video inputs: Digital (DVI) and VGA (Sub-D 15).

You can connect one or more of these inputs. The best and easiest connection is DVI.

If several video inputs are connected (meaning the display is connected to different video controller boards) you can switch inputs by using the display's on-screen display.

Connecting DVI signals: One display:

1. Connect one end of the DVI cable to the DVI input of the display.
2. Connect the other end of the DVI cable to the DVI connector of the display controller. If this board has 2 video heads (2 video outputs), connect to Vid 1 (Head A).

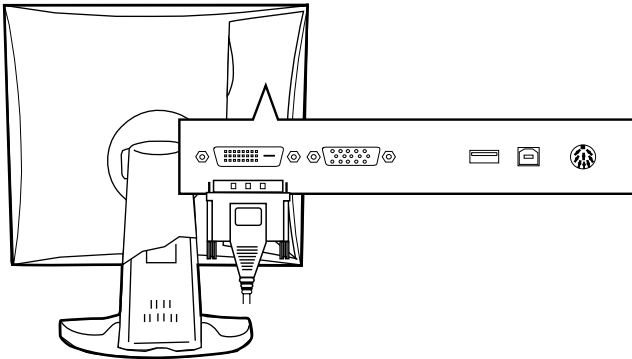


Figure 13

Connecting DVI signals: Two displays:

1. Connect the left display (when looking at the front side) to Vid 1 as described above.
2. Connect the second display to Vid 2 (Head B).

Connecting analog video

Proceed as follows:

1. Connect one end of the VGA cable to the D15 input of the display.
2. Connect the other end of the VGA cable to the analog video output of your computer.

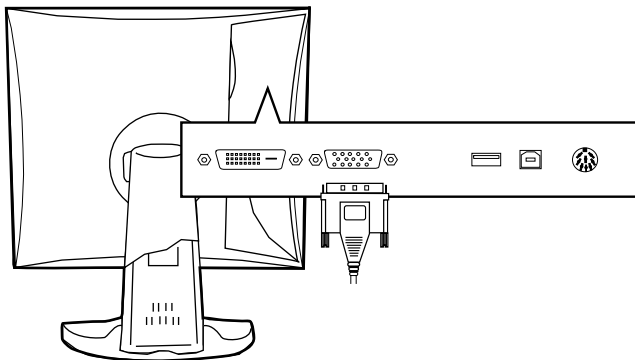


Figure 14

USB connection

If the display receives video from a Barco-supported display controller, it is not necessary to establish a USB connection to use the QA software.

If this is not the case, you must connect the USB cables if you wish to use the QA software.

Moreover, the USB connection allows you to use the display as USB hub, to which you can connect USB devices, such as a keyboard, mouse or digital camera.

To connect the USB cable:

1. Connect the display's USB upstream connector to the USB port of the PC by means of a USB cable.
2. Connect any USB device to any of the display's USB downstream connectors.

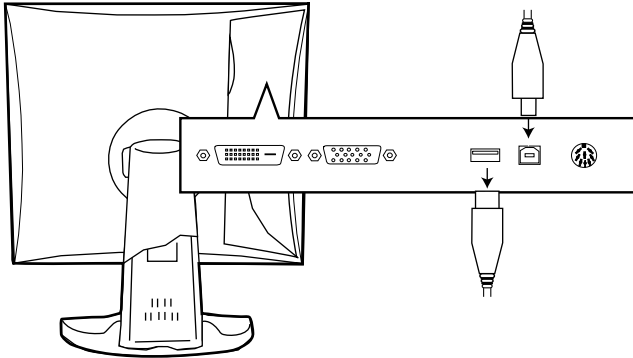


Figure 15

Cable routing

Routing the signal cables

- Bind the cables in the connector compartment together with the cable tie inside the connector compartment.
- Put the connector compartment cover back on the display. Pay attention that the signal cables are positioned under the bulge in the cover.
- Push the cables into the clips on the rear of the tilt & swivel foot.
- Bind the cables together above and under the foot, by means of the 2 velcro strips attached to the inside of the foot cover (packed inside the accessory box).
- At last, put the foot cover back in place.

To put the foot cover in place:

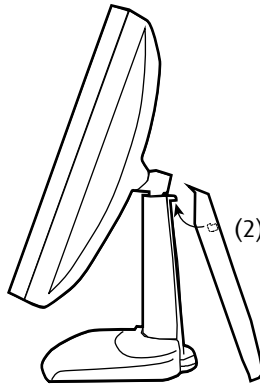


Figure 16:

1. The foot cover is packaged separately in the accessory box. Unpack the foot cover.
2. Push the upper side of the cover onto the foot, so that the hooks inside the cover are positioned right under the bulges at the rear of the foot.
3. Slide the cover upward while moving the lower side of the cover towards the foot.
4. Press the cover to the foot so that it makes a clicking sound.

Attaching the display to an arm

The panel, standard attached to the tilt & swivel foot, is compatible with the VESA 100 mm standard. So it can be used with an arm stand according to the VESA 100 mm standard.

Therefore, the tilt & swivel foot must be removed from the panel.



Important:

- Use an arm that is approved by VESA (according to the VESA 100 mm standard).
- Use an arm that can support a weight of at least 13 kg (28.66 lbs).

To attach the display to an arm stand:

1. Put the display face down on a clean and soft surface. Be careful not to damage the panel screen.
2. Remove the tilt & swivel foot cover.
3. Remove the small screw (A) fixing the small plastic cover on top of the foot. Next, remove the small cover itself.

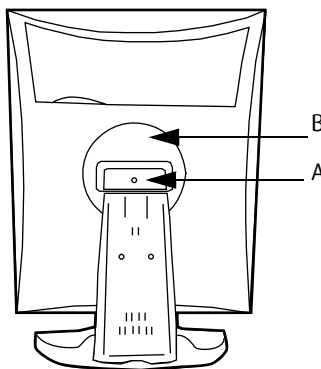
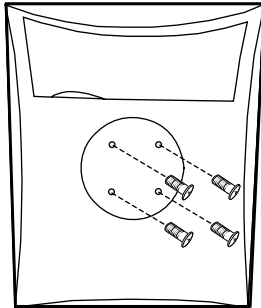


Figure 17: Display with tilt & swivel foot cover removed

4. Unscrew the 2 screws fixing the round plastic cover (B).
5. Lift up the round plastic cover.
6. Remove the four screws fixing the foot while supporting the foot.
7. Attach the arm stand **firmly** to the panel using 4 screws M4 x 8 mm.



4 screws M4 x 8mm

Figure 18

Installing drivers and software

This chapter will guide you through the installation of the drivers, software and documentation associated with your BARCO NIO Display System or BARCO E-2320 C Display(s).

Driver and software installation prerequisites



Note: To install or remove the drivers, software, or documentation you must be logged on as a user with administrator privileges.

Your operating system must be installed and running before you can install the driver, software and documentation for the display controller(s) for your BARCO Display System.

Before you begin make sure that all of your BARCO E-2320 C Display(s) are connected to the appropriate display controller(s) in your system.

Installing drivers and software in Windows

This chapter is divided into two sections. The first section describes the process for installing the drivers and software for the BARCO MXRT family of controllers. The second section describes the process for installing the drivers and software for the BARCOMED CORONIS family of controllers.

Installing the BARCO MXRT drivers and software



Note: The installation dialog will display in English if your operating system's language is not supported.

This process applies to the following versions of Windows:

- Windows 2000 Professional,
- Windows XP Professional,
- Windows Professional x64 Edition,
- Windows Server 2003, and

- Windows Server 2003 x64 Edition.

You will need to install the BARCO E-2320 C Display system drivers and software in the following cases:

- After you have installed the display controller(s) for your BARCO Display System in your system for the first time.
 - After you have reinstalled or upgraded your operating system.
1. Start your system. When the *Found New Hardware Wizard* comes up, click **Cancel**. When the *System Settings Change* window asks you to restart your computer, click **No**.
 2. Run the Barco Product Installation Wizard.

The Barco Product Installation Wizard should start automatically if you insert the BARCO NIO Display System Installation CD-ROM into your computer's CD/DVD drive *after* the operating system has started. If your CD/DVD drive's auto-run is not enabled or the Barco Product Installation Wizard does not start automatically, you can run the Barco Product Installation Wizard manually by following these steps:

- a) Click the **Start** button in the task bar.
- b) Click **Run**.
- c) Click **Browse** and browse to the root directory of the BARCO NIO Display System Installation CD-ROM and click on the file, **Setup.exe**, and click **Open**.
- d) Click **OK**.

or

- a) Browse to the root directory of the BARCO NIO Display System Installation CD-ROM and double click on the file, **Setup.exe**.
3. Click **Next**.
 4. Click **Yes** to accept the terms of the Barco and ATI license agreements. The Barco setup wizard will continue with the installation **only** if you accept the terms of both license agreements. If you click **No**, the wizard will exit.

5. Follow the wizard's on-screen instructions to complete the installation.



Note: There are two options for installing your Barco MXRT controllers driver and software:

Express Installation or
Custom Installation.

In both cases all components will be installed.

If you choose the **Custom** option, you will have the option to modify the following driver settings during the installation process:

- Display Options (color mode),
- Palette Modes, and
- Drawing Modes.

Please refer to your application manuals for information on the correct Color, Palette and Drawing modes to select.

Note: If you select either of the two Static Gray palette modes available under the 256 Color mode, the output from your MXRT display controller will be grayscale and not color when connected to Nio color displays. For more information about Color, Palette and Drawing modes please refer to the Barco Control Panel section of the Barco on-line User Manual.

If you choose the **Express** option, you can modify the above driver settings through the Barco tab of the advanced options of the Windows Display Control Panel. Once the driver and software installation is complete, you can refer to the Display Properties section of the Barco online user manual for more information about these options.

6. When the driver setup is complete, click the **Finish** button.

The Barco Product Installation Wizard will now guide you through the installation of MediCal QAWeb, BarcoMed SelfExam, and the Barco on-line documentation.

7. When the Setup complete message appears, select **Reboot System Now** and click **Finish**.
8. After the system reboots, Windows may display either the *Digital Signature Not Found* message or *The software you are installing for this hardware has not passed Windows logo testing to verify its compatibility with Windows XP* message. If it does click **Yes** or **Continue** to complete the driver and software installation.

Automated display configuration

Once the drivers, software and documentation have been installed and your system has been rebooted, the *Barco Monitor Plug and Play Software* should automatically detect your Barco displays and attach them to the desktop with the correct resolution.

Reinstalling drivers

You can install new drivers or reinstall existing drivers at any time by using the Barco Set-up wizard on your BARCO N10 Display System Installation CD-ROM, see **Installing the BARCO MXRT drivers and software**, on page 49 of this manual.

Uninstalling the drivers and software

To uninstall the Barco drivers, software or documentation for your E-2320 C Systems, please use the *Windows Add/Remove Programs* utility. This can be found in the Windows Control Panel.



Note: When uninstalling the Barco MXRT drivers, the devices must be uninstalled in pairs. When the dialog box shown in figure 19 appears select all of the devices listed.

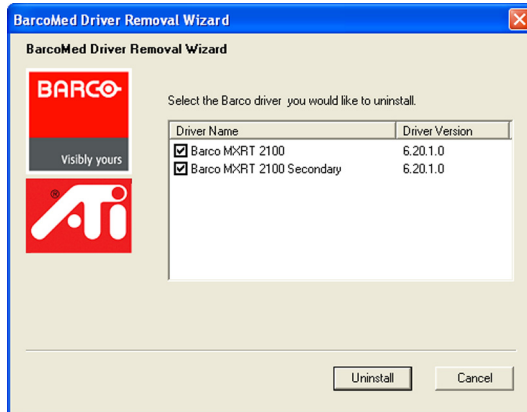


Figure 19: Barco Driver Removal Wizard

Command line (Silent) Install of Drivers and Software

Specifying the silent install option causes most of the GUI associated with the installer to disappear. A background progress window will still be visible, but no user input will be required.

The silent install behavior is dictated by the *SETUP.INI* file. Each application is allowed to have separate command-line parameters for normal and silent installs.

To install the drivers and software silently, please follow the steps below:

1. Insert the BARCO NIO Display System Installation CD-ROM into your CD/DVD drive. When the Barco Product Installation Wizard starts click "**Cancel**".
2. Click the **Start** button in the task bar.
3. Click **Run**.
4. Click **Browse** and
 - a) browse to the root directory of the BARCO NIO Display System Installation CD-ROM.
 - b) Click on the file, **Setup.exe**, and click **Open**.

or

- a) browse to the root directory of the location where you saved the contents of your BARCO Nio Display System Installation CD-ROM.
 - b) Click on the file, **Setup.exe**, and click **Open**.
5. In the *Open* address window, place your cursor at the end of the line of text that appears and add the following text after *Setup.exe*, a space and *-silent*. Click **OK**.

Example (where D is the name of your CD/DVD drive):

D:\Setup.exe -silent

See figure 20 for an example of how the command line window should look when using the silent install from the BARCO Nio Display System Installation CD-ROM.

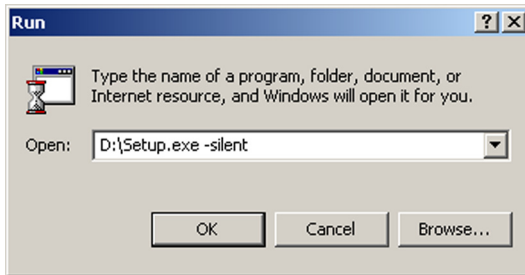


Figure 20:

Operation

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BARCO MXRT control panel settings

This chapter describes how to configure the displays in your BARCO Nio Display System using the tools available through the *Advanced* button on the *Settings* tab of the *Windows Display Control Panel*.

Note: If you purchased Barco Medical Displays only and not a complete BARCO NIO Display System you will need to refer to the user manual for the display controller you are using.

Accessing the Barco tab

Note: You must have logged on to Windows using an account with administrator privileges in order to use the Barco portions of the *Windows Display Control Panel* to change any display settings.

1. Open the *Windows Display Control Panel* by one of the two methods below:
 - a) Start > Settings > Control Panel > Displayor
 - b) Open the “*Display Properties Control Panel*” by right clicking in an empty area on the desktop, then select **Properties**.
2. Click on the **Settings** tab.
3. Select the **rectangle** that represents the Barco Nio display whose settings you wish to change.
4. Click on the **Advanced** button.
5. Select the **Barco** tab from the Properties screen.

Using the Barco tab

The Barco tab is divided into three sections. The first section provides information about the graphics controller and allows access to the

graphics controller advanced configuration pages. The second section provides information about the display. The bottom section allows access to two Barco tools, Barco System Report and MediCal QAWeb. Also, there is a active link to the Barco Medical Imaging Systems web site.



Figure 21: Barco Tab

Barco System Report

The Barco System Report, also known as BarcoMed SelfExam, is a wizard based tool which collects data about the components that are installed in your system. This information is used by the Barco MIS Support team when trying to resolve customer issues.

MediCal QAWeb

Clicking on the MediCal QAWeb button will launch the MediCal QAWeb application. Please refer to the MediCal QAWeb manual for information about this application.

Advanced Properties

To access the advanced properties configuration pages for the display controller(s) for your BARCO Display System, click on the **Advanced** button in the *Graphics Device Information* section.

MXRT controller advanced configuration

There are four pages accessible from the advanced configuration button. They are:

- OpenGL
- Direct3D
- Details
- Configuration
- Barco

OpenGL and Direct3D

The OpenGL and Direct3D pages of the Advanced Properties page are divided into two sections: Main Settings and Custom Settings.

Main Settings

In the Main Settings section there is a slider bar which allows the user to adjust the OpenGL or Direct 3D settings for optimum performance, optimum quality or a for a point in between. There is also a checkbox provided for enabling Custom Settings.

Custom Settings

Note: Barco recommends that you use the default settings, unless your viewing application vendor provides detailed information on custom settings.

In the Custom Settings section the user can fine tune the following options:

- Anisotropic filtering
- SMOOTHVISION
- Texture preference
- Mipmap detail level
- Wait for Vertical Sync

Anisotropic Filtering

Anisotropic filtering is a technique that preserves detail on surfaces that have three-dimensional perspective and fade away into the background. It works best when used in conjunction with Mipmapping.

Anisotropic filtering can be set to favor either an increase in system processing performance or improved image quality.

- If you are unsure how to configure anisotropic filtering, use the **Application Preference** option. Your display will automatically adjust to the application's requirements.

Please refer to the on-line help for more information on using advanced features such as *Anisotropic Filtering*.

SMOOTHVISION

The Advanced Settings tab enables you to apply ATI's SMOOTHVISION technology for full-scene anti-aliasing. SMOOTHVISION improves image quality by removing jagged edges (anti-aliasing) from 3D images, resulting in smoother, more natural looking objects.

Please refer to the on-line help for more information on using advanced features such as *SMOOTHVISION*.

Texture preference

This slider enables you to select the texture quality level.

- Maximize overall performance by moving the slider to the left.
- Enhance overall image quality by moving the slider to the right.

Wait for Vertical Sync:

- For OpenGL the default setting is *Default Off*.
- For Direct3D the default setting is *Application Preference*.

Please refer to the on-line help for more information on using advanced features such as *Wait for Vertical Sync*.

Mipmap detail level

Mipmapping is a texturing technique that preserves the detail on a 3D object's surface as it moves into the background. A series of high- and low-resolution texture maps are stored in memory and selectively used to create the object's surface, depending on what level of detail is needed.

Please refer to the on-line help for more information on using advanced features such as *Mipmap Detail Level*.

Device details

The Device Details page provides detailed information about the display controller connected to the active display. This information is useful in debugging issues that may occur when using your BARCO E-2320 C Display(s).

Configuration

The Configuration page enables you to customize display profiles for individual applications. Typically, you would change these settings for one or more of the following reasons:

- Diagnostic purposes.
- Fine-tuning a specific application/system configuration.
- Specific settings recommended by your hardware or software documentation.
- Tuning your application/system environment for best performance and memory usage.

Activating a configuration profile

The *Configuration Profiles* listbox displays a number of common applications whose optimal configuration profile are factory-set by default.

To activate a particular profile, select the application name from the list and click **Apply**. This will add the information to the necessary Windows registry settings. If prompted, restart Windows.

If you subsequently experience problems with your application, or if you want to try to optimize the performance of your system on specific applications, modify your configuration settings accordingly.

Adding a new application profile

Click the **Add** button in the Configuration Profiles section and enter the name of the new application for which you want to set the configuration parameters.

Modifying the configuration parameters

To change the configuration settings of a specific application, select the name of that application from the *Configuration Profiles* listbox. Click the **Modify** button. Now select or clear the rest of the

configuration controls on this tabbed dialog to obtain the desired display parameters for the selected application.

To remove the selected configuration profile completely, select the name of the application from the *Configuration Profiles* listbox click **Delete**.

Note: You cannot delete the factory-set configuration profiles.

Click the **Apply** or **OK** button to enable your *Configuration* settings.

Barco

The Barco page allows you to switch between True Color Mode (32-bit) and 256 Color Mode (8-bit). Use the 256 Color Mode (8-bit) if your application requires a specific grayscale palette mode such as User Modifiable Color Palette, Static Gray Palette, or Static Gray Palette with NO system colors. Otherwise use the True Color Mode (32-bit).

When the *256 Color Mode* is enabled you can select one of three palette modes:

User Modifiable Color Palette: This option allows applications to modify the palette contents dynamically. This mode reserves the first 10 and last 10 entries in the palette for the Windows operating system, but applications can manipulate the middle 236 entries. This is the standard palette mode as configured by Windows.

Static Gray Palette including standard system colors: This option sets the palette to be a static linear set of 236 gray values. The . Applications are denied the ability to dynamically change or allocate palette entries.

Static Gray Palette with NO system colors: This option sets the palette to be a static linear ramp of 256 shades of gray. Applications are denied the ability to dynamically change or allocate palette entries.

Please refer to the on-line help for more information on using advanced features such as the different palette modes available when using the *256 Color Mode*.

Configuring the Windows desktop



Note: If you are using a color display in conjunction with your Barco grayscale display(s) you should configure your desktop before setting the resolution of your Barco grayscale display(s).

You must have logged on to Windows using an account with administrator privileges in order to use the Barco portions of the *Windows Display Control Panel* to change any display settings.

The recommended configuration for best grayscale image quality when using a color display in conjunction with your high-resolution grayscale display(s) is to set the *color display* as the **primary** monitor of the Windows desktop. Then set the colors setting on the “*Settings*” tab of the *Windows Display Control Panel* to the highest possible color depth (e.g. 32 bits-per-pixel “true color”) supported by the color display’s controller.

The colors setting for your high-resolution grayscale displays should default to 256 colors (8 bits per pixel). You should set the **palette mode** for the your high-resolution grayscale displays to *Static Gray palette with NO system colors*. This guarantees that the all of the 256 gray levels available for GDI graphics will be present. This also eliminates the danger that colors will change when focus moves among different applications.

However, if you are using the *Color to Gray Compatibility* palette mode, the color setting for your high-resolution grayscale displays should default to True Color (32 bits per pixel). Even though this palette mode supports 32 bit True Color, Barco recommends that when using a using a color display in conjunction with your high-resolution grayscale display(s) that you still set the *color display* as the **primary** monitor of the Windows desktop.

Display operation

Operating precautions

Continuous operation of the display with the same image may result in some image sticking on the LCD panel. Over 10 hours operation with the same image content is not recommended.

Switching on DPMS on display and PC and activating a good screen saver may decrease the risk of image sticking (image retention).

Stand-by switching

When the display is on and no on-screen display is visible, push the control wheel at the front for a few seconds to switch the display in stand-by. The LED turns orange.

When the display is in stand-by, push and hold the control wheel to switch it back on. The LED turns green.

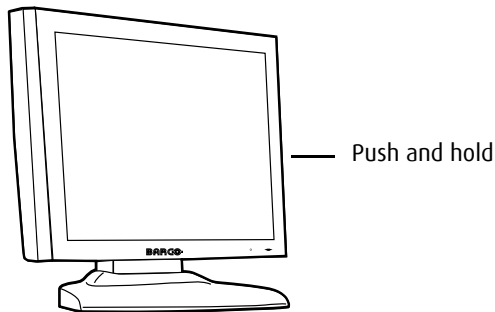
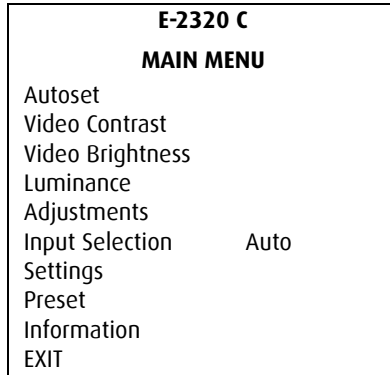


Figure 22

On-screen display

About the on-screen display

The on-screen display (OSD) has a hierarchical structure, with several levels. The top level is the “Main Menu”.



A number of functions are directly accessible from the main menu. Others are grouped in sub-menus.

The content of the on-screen menus depends on the selected video input: The following functions are present in analog mode but are not present in digital (DVI) mode:

- Autoset
- Video Contrast
- Video Brightness
- Preset

This is indicated throughout this manual.

How to navigate through the on-screen display

1. To display the on-screen menus, rotate the control wheel.

2. To enter into a menu or move to a lower level of the menu structure, rotate the control wheel to select the desired menu. Next, press the wheel shortly.
3. To exit from a menu or return to a higher level of the menu structure, rotate the control wheel to select EXIT. Next, press the control wheel shortly.

If you do this when you are in the Main Menu, you exit the menu system.

4. To change an adjustment value, rotate the control wheel to select the adjustment and press the wheel shortly. The adjustment name appears, as well as the current adjustment value. Rotate the wheel to change the value. When done, press the wheel shortly to confirm the change and return to the menu.

Using the Autoset function

* Not available in DVI mode

When do you need to use the Autoset function?

- The first time you use the display with analog video connected.
- After connecting or selecting another analog video source (e.g., changing the PC resolution).
- In case you notice the image geometry or positioning is not as desired.

Required test pattern

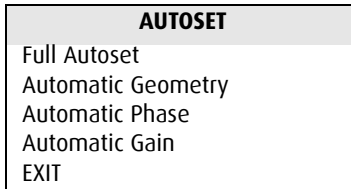
To obtain good results, the image on screen during the Autoset function should meet the following requirements:

- The edges of the image should have an intensity of at least 15% video amplitude. E.g., a Windows desktop pattern would be a good image, provided the background is not too dark.

- The image should contain sharp black-white transitions, like a line pattern or characters.
- The image should contain parts that are completely black (0% video amplitude) and parts that are full white (100% video amplitude).

To perform Autaset:

1. Rotate the control wheel to display the on-screen display. The Main Menu appears. The **Autaset** menu is selected.
2. Press the control wheel to enter the Autaset menu.



3. Rotate the control wheel to select **Full Autaset**.
4. Press the control wheel to execute the function.

Adjusting Geometry

To perform geometry adjustments:

1. Rotate the control wheel to display the on-screen display. The Main Menu appears.
2. Rotate the control wheel to select **Adjustments**.
3. Press the control wheel to enter the Adjustments menu.
4. Rotate the control wheel to select **Geometry**.
5. Press the control wheel to enter the Geometry menu.

You can perform the following adjustments:

| | |
|----------------------|---|
| Automatic Geometry * | This is the same function as in the Autoset menu. Please refer to the description of the Autoset functions above. After Automatic Geometry, the image is centered inside the active video window. Its size depends on the video resolution and the Scaling setting. |
| Hor Pos * | Rotate the control wheel to position the image horizontally inside the active video window |
| Vert Pos * | Rotate the control wheel to position the image vertically inside the active video window |
| Scaling | Click to select the desired scaling option: None: The image is not scaled Best Fit: The image is scaled proportionally to obtain the best fit Full Screen: The image is scaled non-proportionally to fill the screen both horizontally and vertically |

* Not available in DVI mode

Contrast adjustment

This adjustment is not necessary (and not available) when digital video (DVI) is connected and selected.

By default, the contrast is set in calibrated (CAL) position.

To adjust Contrast:

1. Rotate the control wheel to display the on-screen display. The Main Menu appears.
2. Rotate the control wheel to select **Video Contrast**.

3. Press the control wheel to enter the Video Contrast menu.



4. Rotate the control wheel to select **Man Contrast adj**.
5. Press the control wheel to execute the function.
6. Rotate the control wheel to change the Video Contrast value.
7. Press the control wheel to confirm the change of the value and return to the Video Contrast menu.

To return to calibrated position:

1. Proceed as described above to enter the Video Contrast menu.
2. Rotate the wheel to select **Contrast CAL Pos**.
3. Press the wheel to switch to calibrated position.

Additional information

If you change Contrast manually, the changed value is saved in the memory.

Brightness adjustment

This adjustment is not necessary (and not available) when digital video (DVI) is connected and selected.

By default, the brightness is set in calibrated (CAL) position.

To adjust brightness:

1. Rotate the control wheel to display the on-screen display. The Main Menu appears.
2. Rotate the control wheel to select **Video Brightness**.

3. Press the control wheel to enter the Video Brightness menu.



4. Rotate the control wheel to select **Man Brightness adj.**
5. Press the control wheel to execute the function.
6. Rotate the control wheel to change the Video Brightness value.
7. Press the control wheel to confirm the change of the value and return to the Video Brightness menu.

To return to calibrated position:

1. Proceed as described above to enter the Video Brightness menu.
2. Rotate the wheel to select **Brightness CAL Pos.**
3. Press the wheel to switch to calibrated position.

Additional information

If you change brightness manually, the changed value is saved in the memory.

Color temperature selection

To modify a color temperature definition:

1. Rotate the control wheel to display the on-screen display.
The Main Menu appears.
2. Rotate the control wheel to select **Settings.**
3. Press the control wheel to enter the Settings menu.
4. Rotate the control wheel to select **Color Temp.**

5. Press the control wheel to enter the Color Temp Definition menu.
6. Rotate the control wheel to select the color temperature you wish to change to.
7. Click the control wheel to confirm the selection.
The color temperature changes instantly.
8. Exit the menus.

Locking and unlocking user controls

The User Controls function allows to disable or enable the control wheel functions.

When user controls are disabled, you cannot:

- display and use the on-screen display
- switch the display in stand-by mode

To disable user controls:

1. Rotate the control wheel to display the on-screen display. The Main Menu appears.
2. Rotate the control wheel to select **Settings**.
3. Press the control wheel to enter the Settings menu.

| SETTINGS | |
|---------------------|----|
| DPMS | On |
| Power LED | On |
| User Controls | On |
| Automatic Menu Exit | On |
| EXIT | |

4. Rotate the control wheel to select **User Controls**.
5. Press the control wheel to switch from "On" to "Off".
6. Exit the menus and save the changes.

To enable user controls:

1. Do not use the control wheel for at least 3 seconds.
2. Rotate the control wheel 1 step clockwise.
3. Press the control wheel 2 times.
4. Rotate the control wheel 1 step counterclockwise. The on-screen display appears.

Note: Steps 2 to 4 must be performed in maximum 3 seconds.

5. Rotate the control wheel to select **Settings**.
6. Press the control wheel to enter the Settings menu.

| SETTINGS | |
|---------------------|-----|
| DPMS | On |
| Power LED | On |
| User Controls | Off |
| Automatic Menu Exit | On |
| EXIT | |

7. Rotate the control wheel to select **User Controls**.
8. Press the control wheel to switch from "Off" to "On".
9. Exit the menus and save the changes.

Complete OSD overview

Main menu

| Name | Description | Present in DVI mode |
|------------------|--|---------------------|
| Autoset | Allows to perform automatic image adjustments | No |
| Video Contrast | Adjust contrast of the image | No |
| Video Brightness | Adjust brightness of the image | No |
| Luminance | Adjust the target luminance to which the display will be stabilized. | Yes |
| Adjustments | Perform Geometry and Phase adjustments | Yes |
| Input Selection | Select which video signal will be displayed: Digital (DVI) or analog (D-Sub) | Yes |
| Settings | Change settings for DPMS, Power LED, User Controls, Color Temperature and Automatic Menu Exit | Yes |
| Preset | Rename the current Preset or select another Preset that matches the characteristics of the selected video signal | No |
| Information | Read information about the display and the selected video signal | Yes |

Autoset

The Autoset menu is not available in DVI mode.

| Name | Description |
|--------------------|--|
| Full Autoset | Perform all Autoset functions (below) one after another |
| Automatic Gain | Adjust the video levels (black and white) automatically |
| Automatic Geometry | Adjust the image geometry automatically. This function displays the complete active video in the center of the screen. If the video resolution is smaller than the native panel resolution and no scaling is selected (see further), it puts black borders around the active video window. If the video resolution is larger than the native panel resolution and no scaling is selected, the edges of the image will be lost. |
| Automatic Phase | Adjust the video sampling phase and frequency automatically. This is necessary when you notice vertical or horizontal banding or noise in the image. |

When do you need to use the Autoset function?

- The first time you use the display with analog video connected.
- After connecting or selecting another analog video source (e.g., changing the PC resolution).
- In case you notice the image geometry or positioning is not as desired.

Required test pattern

To obtain good results with the autaset functions, it is necessary to have a good image on which to perform the functions.

E.g., a maximized Windows Explorer window would be a good image.

- Automatic Geometry: The edges of the image should have an intensity of at least 15% video amplitude. .
- Automatic Phase: The image should contain sharp black-white transitions, like a line pattern or characters.
- Automatic Gain: The image should contain parts that are completely black (0% video amplitude) and parts that are full white (100% video amplitude).

Video Contrast

This menu is not available in DVI mode.

| Name | Description |
|------------------|---|
| Contrast CAL Pos | Switch to calibrated position of contrast |
| Man Contrast adj | Manually adjust contrast |

Video Brightness

This menu is not available in DVI mode.

| Name | Description |
|--------------------|---|
| Brightness CAL Pos | Switch to calibrated position of brightness |
| Man Brightness adj | Manually adjust brightness |

Luminance

| Name | Description |
|------------------|--|
| Luminance Target | Manually adjust the luminance The calibrated luminance is indicated as 100% |



Caution: Increasing the luminance setting to a value higher than 100% may significantly decrease the lifetime of the display backlight.

Adjustments: Geometry

| Name | Description | Available in DVI mode |
|--------------------|---|-----------------------|
| Automatic Geometry | This is the same function as in the Autoreset menu | No |
| Hor Pos | Position the image horizontally inside the active video window | No |
| Vert Pos | Position the image vertically inside the active video window | No |
| Scaling | Select the desired scaling option. None: The image is not scaled. Best Fit: The image is scaled proportionally to obtain the best fit. Full Screen: The image is scaled non-proportionally to fill the screen completely. | Yes |

Adjustments: Phase

This menu is not available in DVI mode

| Name | Description |
|-----------------|--|
| Automatic Phase | This is the same function as in the Autoset menu |
| Frequency | Adjust the video sampling frequency manually. However, we recommend you use the Automatic Phase function (Autoset menu). |
| Man Phase adj | Adjust the video sampling phase manually. However, we recommend you use the Automatic Phase function (Autoset menu). |

Input Selection

| Name | Description |
|------|---|
| Auto | Automatically selects the input to which a video signal is connected. If more than one video signal is connected, priority is given to DVI. |
| DVI | Select the digital input. Consequently, the Automatic setting will be switched off. |
| DB15 | Select the analog input. Consequently, the Automatic setting will be switched off. |

Settings

| Name | Description |
|-----------------------|--|
| DPMS | Switch on/off the automatic power saving system (DPMS) |
| Power LED | Switch the power LED on/off. Note: The LED's orange DPMS state is not influenced by this setting. So, when the display goes into power-saving mode, the LED will turn orange, even if it was switched off by this setting. |
| User Controls | Disable the control wheel functions |
| Color Temp. | Select a color temperature |
| Preferred Input Freq. | Click the control wheel to select the desired vertical frequency of the input video signal. Select the best frequency corresponding to your graphic board (see the documentation of your graphic board). After changing this setting you must reboot the PC so that the graphic board changes the vertical frequency of the video signal. |
| Automatic Menu Exit | Switch the automatic menu exit feature on/off. When switched on, the OSD menus automatically close when left idle for some time. |

Information - General Information:

| Name | Description |
|--------------------|---|
| Product | The display type |
| Serial No | Indicates the display serial number |
| SW Version | Displays the current internal software version |
| Display Lifetime | Indicates the total time the display has been operating, including the time in stand-by |
| Backlight Lifetime | Indicates the total time the display has been operating, excluding the time in stand-by |

Information - Current Input Format:

| Name | Description |
|----------------|--|
| Input Source | Displays the currently selected input |
| Preset | Displays the currently selected memory Preset |
| Preset Name | The name of the current memory Preset |
| Hor Frequency | The currently measured horizontal sync frequency |
| Vert Frequency | The currently measured vertical sync frequency |
| Resolution | Displays the actual video signal resolution |

Cleaning

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Precautions

- Take care not to damage or scratch the front filter or LCD panel. Be careful with rings or other jewelry that can touch the front filter.
- Do not apply pressure on the front filter or LCD panel.
- Do not apply or spray liquid directly to the front filter, panel or cabinet as excess liquid may cause damage to internal electronics. Instead, apply the liquid to the cleaning cloth.

Proceed as follows:

- Clean the cabinet using a soft cotton cloth, lightly moistened with a recognized cleaning product for medical equipment.
- Repeat with water only.
- Wipe dry with a dry cloth.
- The cabinet has been tested for resistance to the following products:
 - Cidex, Betadine
 - Alcohol (Isopropyl and Ethyl)
 - Ammonia-based cleaners (Windex)
 - Aquasonic Gel

To clean the LCD panel:

- Dust particles on the LCD panel may be blown away by using a dust remover. E.g., DUST OFF 67 (KONTAKT Chemie).

A dust remover is composed of a blend of compressed liquid gases functioning as propellant. They provide a jet of dry inert gas that acts like compressed air for a quick and safe removal of dust particles and other dry contaminants on the surface of the lcd panel or the glass panel.

Attention: The dust remover contains a liquid gas. If you shake the can or move the can too fast while spraying, you may blow drops of liquid on the panel surface!

If this is the case, clean the panel as described below.

- If the LCD panel is dirty or wet, clean the panel using a lint-free, nonabrasive cloth, lightly moistened with a solution of 25% Isopropyl Alcohol (IPA) and 75% de-ionized or distilled water. E.g.: Cleareen, a product of Certified Laboratories. In case you do not dispose of these products, use plain water instead.
- Take another clean, dry, soft, lint-free cloth and gently wipe the glass dry.

Troubleshooting

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General tips

- If one display from a multi-head system exhibits problems, try to eliminate the problem by switching video cables or power supplies. In that way you can find out if the problem resides in the display or not.

Problems and solutions

| Problem description | Possible tests or solutions |
|--------------------------------------|--|
| Screen remains black | <ul style="list-style-type: none"> • Please check the installation procedure in this manual • If the LED at the front is orange, the display is in stand-by • Check in the Windows Display Properties if the display controller video heads are attached. If not, there will be no image on the screen. • The graphic board resolution may be too low. See note below. • The external power supply may be defective |
| Image exhibits noise or interference | <ul style="list-style-type: none"> • The video cable may be of poor quality • DVI video cable may not be firmly connected to the PC or to the display • Display may need Phase and Frequency adjustments (if analog video is selected) |
| Image contains missing pixels | <ul style="list-style-type: none"> • A number of missing pixels is normal (inherent in LCD technology) |
| Image contains not enough greyscales | <ul style="list-style-type: none"> • Adjust the Display Function to DICOM by means of the QA software • You may have installed the driver software with an inappropriate selection of Palette Settings. Install the driver software again and set Palette Settings to 24/32 bit color. |

| Problem description | Possible tests or solutions |
|--|---|
| The PC does not start up | <ul style="list-style-type: none"> • Check the CMOS settings in the PC BIOS • The display controller may not be firmly seated in the connector |
| No image during PC start-up | <ul style="list-style-type: none"> • Check the CMOS settings in the PC BIOS |
| Nothing happens when you press or turn the control wheel | <ul style="list-style-type: none"> • The User Controls may be disabled. Please read the paragraph about the "User Controls" function. |
| The image is non-proportionally spread out over the screen | <ul style="list-style-type: none"> • Select another resolution in the Windows "Display Properties" control panel • Switch the "Scaling" function (Geometry menu) in the display OSD to "None" or "Best Fit" |
| The image on the screen is rotated 90° | <ul style="list-style-type: none"> • Rotate the image using the display controller control panel. See the display controller manual |
| The previous image remains slightly visible on the screen | <ul style="list-style-type: none"> • This phenomenon, called "image sticking" is normal if the same image has been on the screen for a long time. The ghost image will disappear after some time. Over 10 hours operation with the same image content is not recommended. Switching on DPMS on display and PC and activating a good screen saver may decrease the risk of image sticking (image retention). • A slight case of image sticking can be solved by continuously displaying a full white image during a number of hours. |

| Problem description | Possible tests or solutions |
|---|--|
| On a dual-head system, the images on the left and right display seem to be switched | <ul style="list-style-type: none">• Switch the video cables at the display controller or at the display video inputs |

Note: What if the graphic board resolution is too low

Some non-Barco graphic boards (e.g., single-link boards) may have an insufficient resolution to drive the display. You can solve this problem by forcing the graphic board to operate on a lower vertical frequency. Therefore, proceed as follows:

1. Shut down the PC.
2. In the display OSD, browse to the Settings menu.
3. Select the function **Preferred Input Freq.**
4. Select **45 Hz** as vertical frequency.
5. Exit the OSD.
6. Reboot the computer.

After reboot, the signal from the graphic board should now be visible on the display.

Technical Information

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Technical specifications

E- 2320 C (SE):

| Item | Specification |
|--|--|
| Picture panel | 20.1-inch diagonal viewable screen TFT (thin film transistor) active matrix, color liquid crystal display |
| Resolution | Native: 1600 x 1200 |
| Display area (H x V) | 408 x 306 (mm) |
| Viewing angle (typical, @ 10/1 contrast) | Vertical: 176° Horizontal: 176° |
| Pixel Pitch | 0.255 mm (H) x 0.255 mm (V) |
| Native color resolution | 24 bit color |
| Luminance | 180 cd/m ² (calibrated) |
| Contrast ratio (typical) | 900/1 (on/off in dark environment) |
| Response time | 8 ms typical (@ 25° C after 30 min warm-up) |
| Controls | Push / turn control wheel for stand-by switching and OSD controls |
| Input connectors | DVI single link, D-Sub15 pin |
| Signal systems | DVI Digital, RGB Analog Video on DVI: Complying to DVI Rev 1.0 specifications Sync on DVI: Complying to DVI Rev 1.0 specifications |

| Item | Specification |
|------------------------|---|
| Input signals | Possible resolutions: • 640 x 480 @ 60, 75, 85, 100 Hz • 800 x 600 @ 60, 75, 85, 100 Hz • 1024 x 768 @ 60, 75, 85, 100 Hz • 1152 x 864 @ 75 Hz • 1152 x 870 @ 60, 85, 100 Hz • 1280 x 1024 @ 60, 75, 85 Hz • 1600 x 1200 @ 59, 60 Hz (*) |
| USB standard supported | USB 1.1 |
| Power source | Input for 12 VDC power supply unit: 90 ~ 264 VAC Input for display: 12 VDC. (The supplied 12VDC power supply must be used) |
| Power consumption | 64 watts (max., at 90 VAC, maximum backlight, USB load) |
| Dimensions (W x H x D) | In perpendicular vertical position, highest position, tilt = 0°, swivel = 0°: 385 x 585 x 250 mm |
| Net weight | 12 kg |
| Operating Temperature | 0°C to 40°C, 15°C to 35°C within specs |
| Storage Temperature | -20°C to 60°C |
| Humidity | 8% - 80% (non-condensing) for operation 5% - 95% (non-condensing) for storage |
| Altitude | 7500 m storage 3000 m operation |

Connector pin assignments

DVI connector:

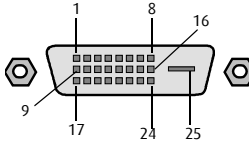


Figure 23: DVI connector pin layout

| Pin no. | Signal | Pin no. | Signal |
|---------|--------------|---------|-----------------|
| 1 | TMDS DATA 2- | 14 | +5V POWER |
| 2 | TMDS DATA 2+ | 15 | GND |
| 3 | GND | 16 | HOT PLUG DETECT |
| 4 | NC | 17 | TMDS DATA 0- |
| 5 | NC | 18 | TMDS DATA 0+ |
| 6 | DDC CLOCK | 19 | GND |
| 7 | DDC DATA | 20 | NC |
| 8 | NC | 21 | NC |
| 9 | TMDS DATA 1- | 22 | GND |
| 10 | TMDS DATA 1+ | 23 | TMDS CLOCK- |
| 11 | GND | 24 | TMDS CLOCK+ |
| 12 | NC | 25 | GND |
| 13 | NC | | |

D-Sub 15 connector (analog video):

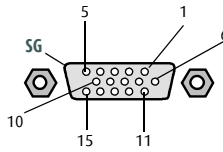


Figure 24: D-Sub 15 pin layout

| Pin no. | Signal | Pin no. | Signal |
|---------|----------|---------|-----------------|
| 1 | Red in | 9 | DDC 5V IN |
| 2 | Green in | 10 | VGA PRES |
| 3 | Blue in | 11 | NC |
| 4 | NC | 12 | DDC SDA |
| 5 | GND | 13 | HS IN |
| 6 | GND | 14 | VS IN |
| 7 | GND | 15 | DDC SCL |
| 8 | GND | SG | Shielded Ground |

Glossary

Calibration

Each display is calibrated in the factory before it is sent to the customer. After this calibration, black and white luminance are set to the ideal level.

A stabilization routine, constantly active when the display is on, keeps these levels constant using the built-in sensor.

Display Function

A Display Function describes how a display device converts the video signals at the inputs into light.

In the context of a medical viewing station, a display device is the combination of display controller (graphics board) and display.

The display function is a graph that shows how the light from the display panel evolves from minimum to maximum luminance while the data levels at the input of the display controller go from 0 to maximum.

Display Controller head

A display controller (graphics board) converts the digital data from the computer into digital or analog video voltages.

Most of the common display controllers contain just one set of video and sync outputs. However, some high-end boards, like some of the BarcoMed boards, contain two sets of video and sync outputs. This is called a dual head display controller. It is like two complete display controllers implemented on one single unit.

A dual head board in the computer behaves exactly as if two separate boards were installed.

DICOM

DICOM stands for Digital Imaging and Communications in Medicine. It is a standard developed by the American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA).

The standard specifies how digital image data can be moved from system to system.

In addition, Supplement 28 Part 14 specifies a function that relates pixel values to displayed Luminance levels and is called Grayscale Standard Display Function.

Presets and Internal memory system

The memory of the display contains maximum 200 fixed and 28 programmable Presets.

When you connect a video signal, the display checks in the memory for a matching Preset.

If it finds one, it selects the corresponding settings and parameters from the memory. If it does not find a matching Preset, the display uses default settings to display the image.

When you make adjustments and save the changes, the current Preset is saved as programmable Preset. If this happens while all programmable Presets are occupied, the oldest programmable Preset is overwritten automatically.

Warranty Statement

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ARTICLE 1: SERVICES

Barco n.v. warrants that the equipment will be free of defects in workmanship or material for the warranty period.

Notwithstanding the provisions of clause 2, repair and replacement of defects in material and/or workmanship under this warranty shall be accomplished in our works in the following manner:

1.1 The Customer, upon the occurrence of any equipment failure, shall contact Barco Customer Support Center (or an authorized service center) by telephone, fax or e-mail and shall provide the applicable Customer Support person with a complete description of the problem being encountered, including the model and serial number of the equipment in which the problem has arisen.

1.2 The Customer Support person shall diagnose the problem experienced by the Customer and shall advise the Customer on how to proceed. Customer Support may ask to return the faulty equipment or faulty subassemblies to the Barco Customer Support Center (or an authorized service center) for repair activities. The Customer shall ask for a RMA or RAN number to a Barco Customer Support Center (or an authorized service center).

1.3 The Customer shall return, freight prepaid, the defective equipment or subassemblies for repair to the Barco Customer Support Center (or an authorized service center).

1.4 Replacement parts used shall be new or equivalent to new parts for the revision level of the equipment. The warranty period for the replacement parts will expire at the same moment as the original warranty period of the equipment. All parts replaced hereunder and returned to Barco (or an authorized service center) shall become the property of Barco n.v. (or the authorized service center).

1.5 The repaired equipment shall be returned to the Customer, by regular freight, at Barco's charge.

ARTICLE 2: ITEMS EXCLUDED FROM WARRANTY

The warranty described herein shall not include the following:

2.1 Any hardware or software item procured from a source other than Barco or their official agent or distributor and integrated by Customer or a third party into Barco supplied equipment.

2.2 Any host configuration not explicitly supported by Barco.

2.3 All software installed on the system, whether they are acquired from Barco n.v. or third party. An exception is made for software delivered by Barco that would prove to be a cause for the malfunctioning of the hardware covered under this Agreement.

2.4 Normal wear and tear, use under circumstances exceeding specifications, abuse, unauthorized repair or alternation, lack of proper maintenance.

2.5 Any failures resulting from an accident, negligence (such as but not limited to removing or deleting system files & licensed software product files), misuse, circuit failure or any change, damage due to fire, water, thunder or lightning, power failure or fluctuation, disruption of communication lines or due to force majeure, or any reason foreign to the equipment.

2.6 Any specific services or procedures, asked for by Customer, related to verification of repaired equipment.

ARTICLE 3: OBLIGATIONS OF THE CUSTOMER

Customer hereby assumes the following obligations as partial consideration for Barco performance of its requirements under the warranty condition; failure by Customer to meet its obligations under

this paragraph shall excuse Barco's performance hereunder:

3.1 Customer shall not expose Barco personnel to any unsafe working conditions.

3.2 Repairs to equipment under warranty resulting from improper maintenance or repair performed by the Customer, or its officers, agents, employees, or representatives, shall be borne by the Customer at its additional cost and expense.

3.3 The customer is responsible for installing the Barco equipment in an environment for which it was intended. If there is an indication that the equipment was used - even temporary - outside its specifications, Barco n.v. is entitled not to perform warranty repairs and terminate the warranty agreement. Any actions that have been taken by Barco n.v. in this respect, may be invoiced to the Customer at normal pricing.

ARTICLE 4: MODIFICATIONS OR CHANGES TO THE EQUIPMENT

Customer may make additions to the equipment only with explicit written consent of Barco n.v.

Any attempt to do so, voids the warranty.

ARTICLE 5: DISCLAIMER OF WARRANTIES

Barco n.v. disclaims all warranties, expressed or implied, including all implied warranties of merchantability and fitness for a particular purpose.

ARTICLE 6: LIMITATION OF LIABILITY

Barco n.v. shall not under any circumstances be liable to customer or any third party for direct, indirect, incidental, special or consequential damages, such as but not limited to, damage to or loss of tangible or intangible property or equipment, loss of profits or revenues, cost of capital, cost of purchase of replacement goods, or claims of customers of user for service interruptions. The liability of Barco for manufacturing, sale, delivery, resale, installation, operation or suitability for use of any products or services covered by or furnished under this warranty condition, whether arising out of contract, negligence, strict tort, warranty or otherwise, shall not exceed the price of the item or items of goods or services upon which such liability is based.

ARTICLE 7: FORCE MAJEURE

Either party shall be released from performance of its obligations under this agreement to the extent, and for so long as, the performance of this agreement is impeded by reason of force majeure. For the purposes of this clause the expression "force majeure" means, but shall not be limited to, industrial dispute, fire, mobilization, requisition, embargo, currency transfer prohibitions, insurrection, lack of means of transport, restrictions of the use of energy, and generally any circumstances which are beyond the control of the parties and hinder performance by one party of his obligations.

ARTICLE 8: GENERAL

8.1 Customer acknowledges its understanding that all software and electronic devices, including Barco products are subject to possible error, mechanical or electrical failure, and should not be relied upon in inappropriate applications or without proper backup and/or other safety precautions whenever personal injury or property damage may result from failure or error of the product.

8.2 Barco n.v. shall not be responsible for machine failure and/or its failure to render service or maintenance due to causes beyond its reasonable control.

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