

Color Coronis 2MP



Installation & User Manual

Supported displays: MFC D 2320, MFC D 2321

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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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FCC notice

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.

Disposal Information

The lamps inside the display contain mercury. Do not throw the display in the trash. Dispose of it as required by local ordinances or regulations.

Safety Instructions

General Recommendations

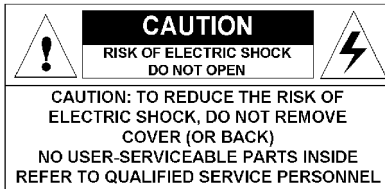
Read the safety and operating instructions before operating the display.

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 screen may result in some image sticking on the LCD panel.

Over 10 hours operation with the same image content is not recommended.

Switching on the display DPMS 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"

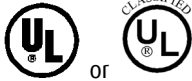
Explanation of symbols

Symbols on the display and 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



c

or

C

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



Indicates the display is approved according to the DEMKO regulations



Indicates the USB connectors on the display

Symbols used throughout the manual:



Warning



Caution



Important notice or remark



Note



Hint, tip



Additional information

Introduction

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Overview

Thank you for choosing Barco.

Single display or complete system?

This manual describes installation and usage of a complete Coronis system. A Coronis system is a bundling of one or more displays and one or more display controllers.

However, if you have purchased the display only instead of a Coronis system, please refer to the chapters in this manual covering the display, and disregard the information about the display controller.

BarcoMed 2MP2CF-3D Overview

The BarcoMed 2MP2CF-3D Display Controller delivers a quality image with 24-bit True Color for medical viewing applications.

Minimum system requirements

- Pentium 4, Athlon or compatible processor
- 256MB of system memory (minimum)
for optimum performance consult your application provider
for their recommended minimum system memory
requirements
- AGP 4X or 8X slot with no obstructions
- Windows 2000 Service Pack 4 or
Windows XP Service Pack 1

Features of the BarcoMed 2MP2CF-3D display controller

- AGP card
- 256MB Video Memory
- Dual Head Configuration, each head is supported
independently

- Landscape or Portrait Mode
- High quality image with 24-bit true color
- 8-bit grayscale rendering for viewing grayscale images on Coronis Color Displays
- OpenGL support with hardware acceleration
- Direct3D support with hardware acceleration
- Geometry Processing
- Texture Processing
- Pixel Processing
- Hardware cursor
- Display properties control panel to dynamically change display settings
- Control panel supports the English (U.S.), Dutch, German, Korean, Japanese, Simplified Chinese and Traditional Chinese languages
- Displays VGA boot messages on Color Coronis 2MP displays.

Supported resolutions for each head of the BarcoMed 2MP2CF-3D display controller

- 1600 x 1200 @ 60 Hz, 24-bit true color
- 1200 x 1600 @ 59 HZ, 24-bit true color
- 1280 x 1024 @ 60 Hz, 24-bit true color
- 1024 x 1280 @ 59 Hz, 24-bit true color

The following resolution is also available on head 1 prior to installing the driver or when the OS is booted in VGA mode.

- 640x480 @ Default Refresh Rate, 16 colors

BarcoMed 2MP2CP Overview

The BarcoMed 2MP2CP Display Controller delivers a quality image with 24-bit True Color for medical viewing applications.

Minimum system requirements

- Pentium 4, Athlon or compatible processor
- 256MB of system memory (minimum)
for optimum performance consult your application provider for their recommended minimum system memory requirements
- 32-bit PCI slot with no obstructions
- Windows® 2000 Professional Service Pack 4 or Windows® XP Professional Service Pack 1

Features of the BarcoMed 2MP2CP display controller

- 32-bit/33MHz Single Slot PCI card
- 64MB Video Memory
- Dual Head Configuration, each head is supported independently
- Landscape or Portrait Mode
- High quality image with 24-bit true color
- 8-bit grayscale rendering for viewing grayscale images on Corionis Color Displays
- OpenGL support with hardware acceleration
- Direct3D support with hardware acceleration
- Geometry Processing
- Texture Processing
- Pixel Processing
- Hardware cursor

- Display properties control panel interface to dynamically change display settings
- Control panel supports the English (U.S.), Dutch, German, Korean, Japanese, Simplified Chinese and Traditional Chinese languages
- Displays VGA boot messages on Color Coronis 2MP displays.

Supported resolutions

The following resolution is available on both heads prior to installing the driver or when the operating system is booted in VGA mode.

- 640x480 @ Default Refresh Rate, 16 colors

The following resolutions are available on each head of the BarcoMed 2MP2CP display controller.

Flat panel resolutions

- 1600 x 1200 @ 60 Hz, 24-bit true color
- 1200 x 1600 @ 59 HZ, 24-bit true color
- 1280 x 1024 @ 60 Hz, 24-bit true color
- 1024 x 1280 @ 59 Hz, 24-bit true color

Vesa modes available:

- 800x600, 24-bit true color
- 1024x768, 24-bit true color
- 1152x864, 24-bit true color
- 1280x960, 24-bit true color
- 1920x1080, 24-bit true color
- 1920x1200, 24-bit true color

Thank you for choosing Barco.

MFCD 2320/2321 display

The MFCD 2320 is a 20.1-inch (MFCD 2321: 21.3-inch) color LCD display with a native resolution of 1600 x 1200.

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

I-Guard

I-GUARD® is Barco's patent-pending, built-in calibration device, continuously maintaining image quality. With I-GUARD®, QA checks no longer need to disturb normal radiology activities, as they can be performed while applications are running.

I-GUARD® allows radiologists or QA administrators to calibrate their viewing stations or adjust the panel's curve to DICOM standards without administrator intervention.

Ambient Light Compensation (ALC)

When enabled, the ALC system automatically adapts the display light output, depending on the ambient light in the room. The ambient light is measured by the ALC optical sensor located at the front of the display.

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.

The power saving system works with the standard Windows power saving and with the DPMS function on the BarcoMed display controller.

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

Coronis System package

Each Coronis system contains one or more display boxes (see below) and a *system* accessory box containing the following items:

- Display controller(s)
- CD-ROM with driver and documentation
- MediCal Pro software
- MediCal Pro user 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
- American power cord
- Chinese power cord
- This manual

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

Parts, controls and connectors

Front

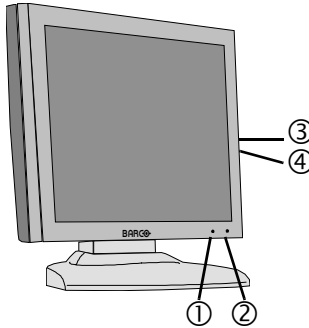


Figure 1

1. Ambient Light (ALC) sensor. When ALC is switched on, the display light output is adapted automatically, depending on the ambient light measured by the sensor.

2. 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.

3. 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.

4. USB downstream port. See also item "6." on page 28

Rear

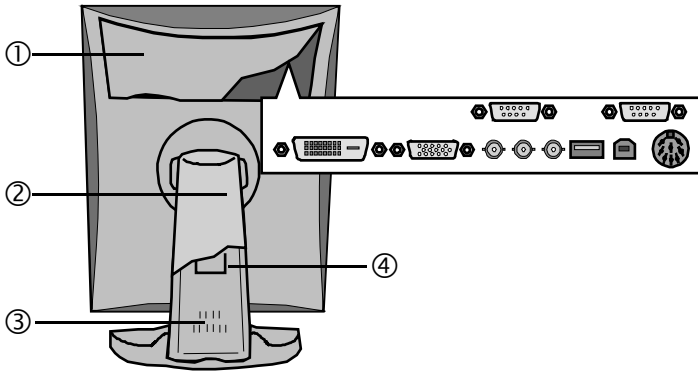


Figure 2

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. 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.

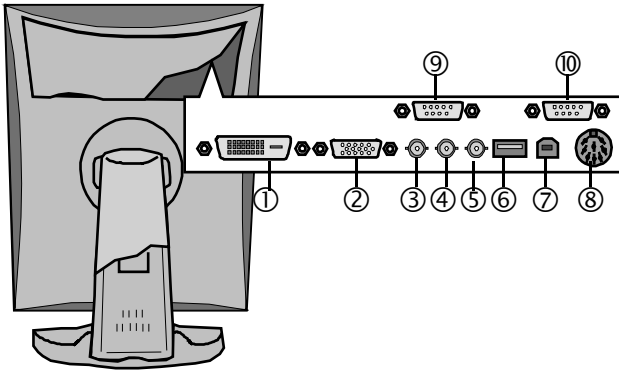


Figure 3

1. DVI (digital) video input
2. D-Sub 15 (VGA) video input
3. Composite video input

This is a *monochrome* video input

Video amplitude: 700 mV

4. Vertical Sync (VS) input
Amplitude: 700 mV to 4V
5. Horizontal Sync (HS) input
Amplitude: 500 mV to 4V
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 control the display via the USB bus or if you simply 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.

9. RS-232 output (D-Sub 9 male)

Connect this connector to the RS-232 input of the following display if you wish to control that display via RS-232.

In that case, the RS-232 input of the first display must be connected to a PC COM port.

10. RS-232 input (D-Sub 9 female)

Connect this connector to a PC COM port if you wish to control the display via RS-232.

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Display controller installation

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Installing the BarcoMed 2MP2CF-3D display controller



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

Prior to installing your BarcoMed 2MP2CF-3D display controller in your PC please take a few minutes to familiarize yourself with both the display controller and the AGP slot in your computer.

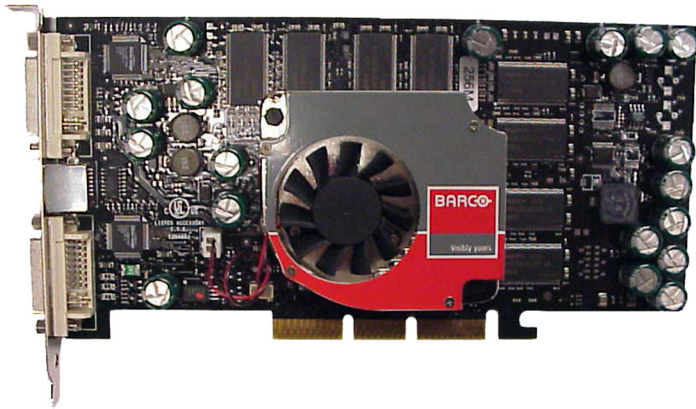


Figure 4: The BarcoMed 2MP2CF-3D display controller

Install the BarcoMed 2MP2CF-3D controller in your computer following these steps:

1. Turn off the power to your computer and disconnect the power cord, however make sure that the computer chassis is still grounded.
2. Remove the chassis cover according to the manufacturer's instructions. Be sure to observe safety warnings.
3. Install the BarcoMed 2MP2CF-3D display controller into your systems AGP slot. Be sure that the display controller is seated firmly in the slot.
4. Secure the card to the chassis with the PC's I/O panel mounting screw, and replace the chassis cover.

5. Connect the primary display to the connector at the top of the IO panel on the BarcoMed 2MP2CF-3D display controller using the provided DVI cable (see figure 5 below). For a dual-headed BarcoMed 2MP2CF-3D setup, connect the secondary display to the other connector on the display controller.
6. Reconnect the power cord, turn on the power, and boot the system as usual.



Figure 5

Installing the BarcoMed 2MP2CP display controller



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

Prior to installing your BarcoMed 2MP2CP display controller(s) in your PC please take a few minutes to familiarize yourself with both the display controller(s) and the PCI slots in your computer.

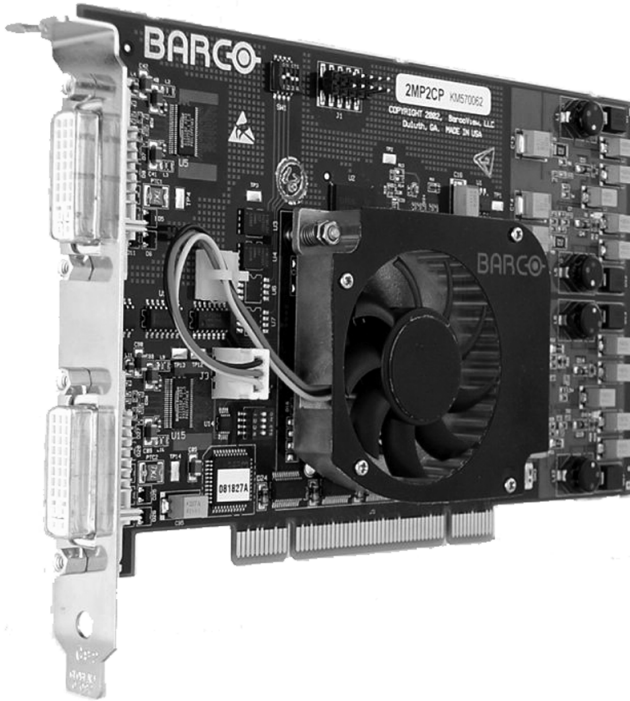


Figure 6: The BarcoMed 2MP2CP display controller

Using the VGA capabilities of the BarcoMed 2MP2CP display controller

Prior to installing the BarcoMed 2MP2CP controller, decide if you are going to use its on-board VGA capabilities. If you are, check the setting of the switches at SW1 on the display controller (see figure 7 below). By default, VGA should be enabled, switch 1 on and switch 2 off. If you decide to use a separate VGA monitor as your boot monitor, you must disable the BarcoMed 2MP2CP's on-board VGA capabilities by changing the switch settings to switch 1 off and switch 2 on.

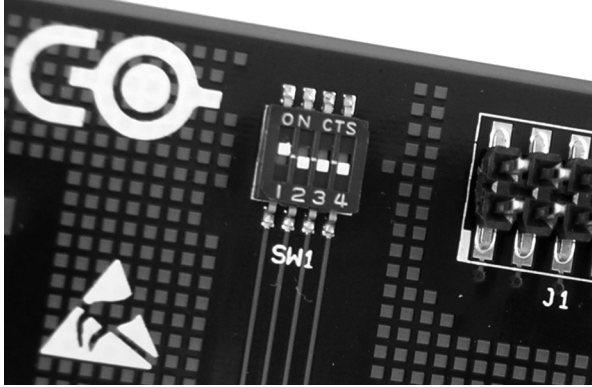


Figure 7

In figure 7 above, the VGA capabilities of the BarcoMed 2MP2CP are enabled.



Caution: To use multiple BarcoMed 2MP2CP controllers in a single host with VGA enabled, you should **enable** VGA on only *ONE* of the BarcoMed 2MP2CP display controllers and **disable** VGA on *ALL* the other BarcoMed 2MP2CP display controllers.

Examples of PCI slots

The BarcoMed 2MP2CP display controller may be installed in either a 32-bit or 64-bit slot with no loss of functionality. Figure 8 on page 37 illustrates the types of slots so that you can correctly identify which one to use for the BarcoMed 2MP2CP display controller and which ones not to use.

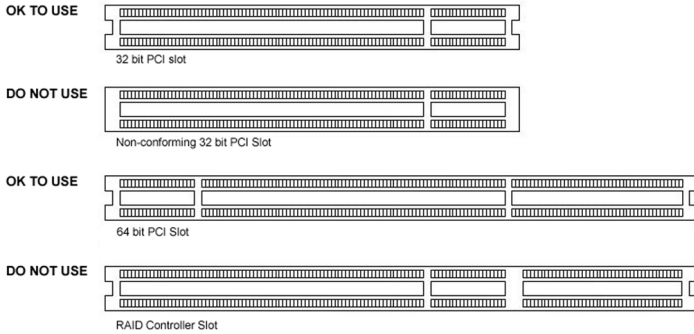



Figure 8: PCI and RAID Controller Slots

Installing the BarcoMed 2MP2CP display controller

Install the BarcoMed 2MP2CP controller in your computer following these steps:

1. Turn off the power to your computer and disconnect the power cord, however make sure that the computer chassis is still grounded.
2. Remove the chassis cover according to the manufacturer's instructions. Be sure to observe safety warnings.
3.  If you have decided to use the on-board VGA capabilities of the BarcoMed 2MP2CP controller (see **“Using the VGA capabilities of the BarcoMed 2MP2CP display controller”** on page 35), you must now remove any VGA controllers that are currently installed in the computer or disable any VGA controllers that are integrated into your PC's motherboard.
4. Install the BarcoMed 2MP2CP display controller into a free PCI slot, either 32-bit or 64-bit (see figure 8 above, for examples of slots). Be sure that the display controller is seated firmly in the slot.
5. Secure the card to the chassis with the PC's I/O panel mounting screw, and replace the chassis cover.

6. Connect the primary display to the connector marked “VID 1” on the BarcoMed 2MP2CP display controller using the provided DVI cable (figure 5 below). For a dual-headed BarcoMed 2MP2CP setup, connect the secondary display to the other connector on the display controller.
7. Reconnect the power cord, turn on the power, and boot the system as usual.

Running multiple BarcoMed 2MP2CP Display Controllers in a single host

The physical order of the displays may vary when you are running multiple BarcoMed 2MP2CP display controllers. This is due to the PC’s PCI bus control in the system BIOS, and not the BarcoMed display controller. It may become necessary, depending on how your PC’s BIOS configures the PCI bus, to switch your DVI display connections to achieve a linear desktop configuration.



Figure 9

Display 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.
- Place the display on a strong and stable table or desk.
- Keep the display away from heat sources and provide enough ventilation around the display.
- Do not scratch or apply pressure to the LCD panel. This may damage the panel permanently.

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.

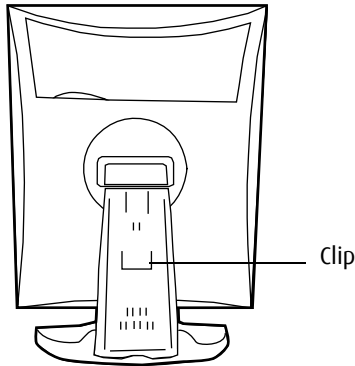


Figure 10

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.

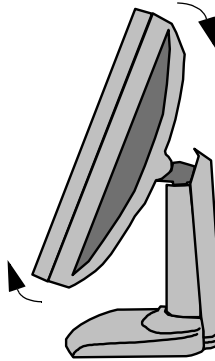


Figure 11

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

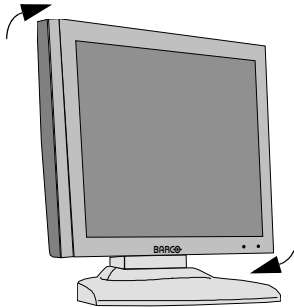


Figure 12



Notice:

If, after installing the display or the system, you change the panel orientation while an image is on the screen, the result depends on your application:

- In a Color Coronis system, the image orientation will adapt to the new panel orientation automatically after a second.
- If the I-switch software is installed and enabled, the image resolution will also be adapted automatically to the new panel orientation.
- If you use the display stand-alone, the image orientation will not change with the panel orientation.

Only the orientation of the on-screen display (OSD) will change automatically in case "Orientation" in the OSD Geometry menu is set to "Automatic".

To change the orientation of the image, you will have to change the resolution in the Windows Display control panel (if possible).

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 12V DC power supply to the DC input of the display.

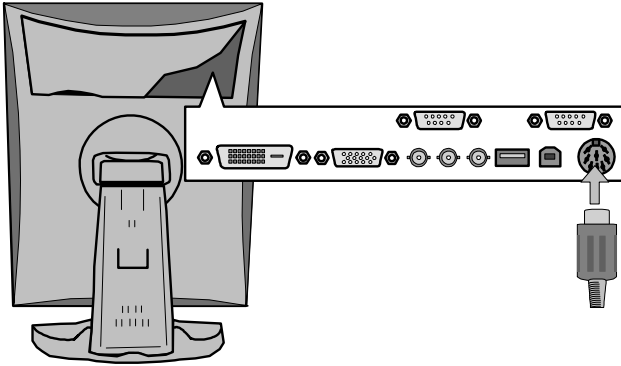


Figure 13

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

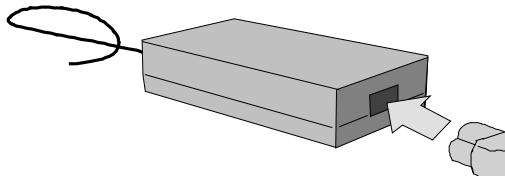


Figure 14

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 3 different video inputs: Digital (DVI), BNC 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.



Note:

In a Coronis system, the video source is the BarcoMed display controller. In that case, only DVI signal connection is applicable.

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 Head A.

Connecting DVI signals: Two displays:

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

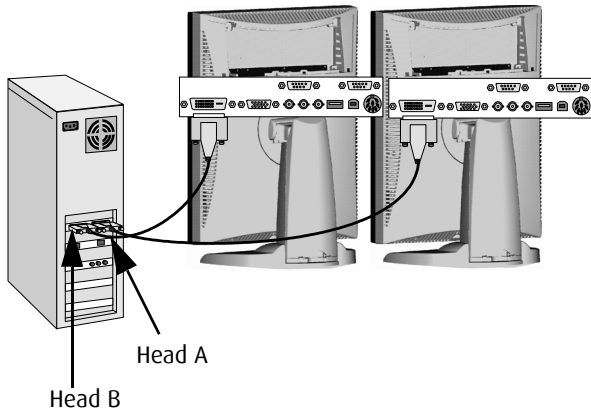


Figure 15

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.

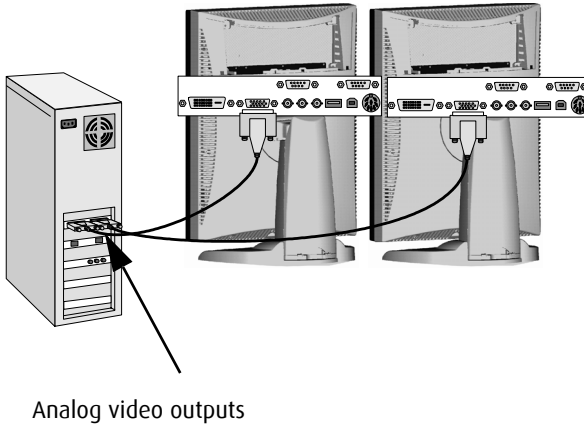


Figure 16

Connecting analog video to the BNC inputs

The video signal must be monochrome. You should use a proper video cable (e.g., from VGA to BNC). This cable is not delivered with the system.

Proceed as follows:

1. Connect one end of the signal cable to the analog video output (monochrome) of the PC.
2. Connect the Video signal to the display's BNC input labeled "Video".
3. Connect the horizontal or composite sync signal to the display's BNC input labeled "HS/CS".
4. Connect the vertical sync signal to the display's BNC input labeled "VS".

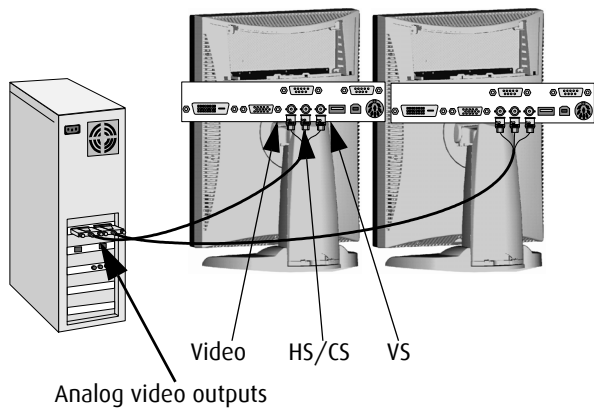


Figure 17

USB connection

If you have connected analog video, you must connect the USB cables if you wish to control the display via external software (e.g., MediCal Pro). If digital video is connected, it is not necessary to establish a USB connection to use external control 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.

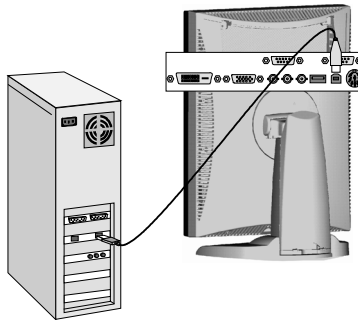


Figure 18

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:

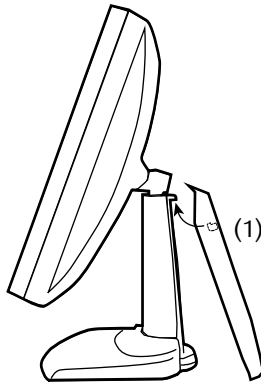


Figure 19

1. 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.

2. Slide the cover upward while moving the lower side of the cover towards the foot.
3. Press the cover to the foot so that it makes a clicking sound.

Attaching the display to an arm stand

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 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.

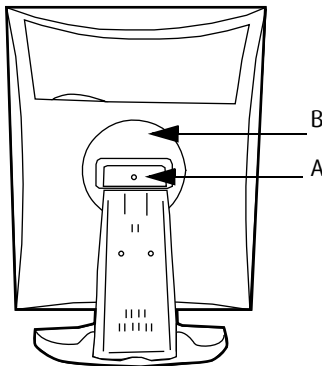
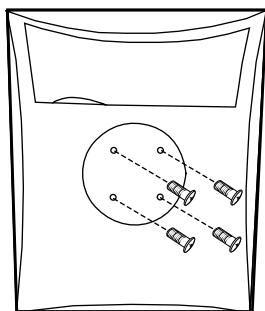


Figure 20: Display with tilt & swivel foot cover removed

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 21

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Display controller software installation

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Software installation



Note: These instructions apply to both **Windows® 2000 Professional** and **Windows® XP Professional**.

Preparation

Prior to installing your Color Coronis 2MP software the following should be done.

1. Install the Color Coronis 2MP display controller(s) in your system.
2. Connect the Color Coronis 2MP display panel(s) to the Color Coronis 2MP display controller(s) and power supply(s).
3. Decide if you want to install the Barco DPMS Screen Saver Software in addition to the driver.

Color Coronis 2MP Using the BarcoMed product installation wizard

To install your Color Coronis 2MP Windows display controller driver and the Barco DPMS Screen Saver Software for the first time follow the steps below.

If you are reinstalling the drivers or installing a new driver release over an existing driver release you may skip steps 2 and 3 below:



1. Boot your system, and log in using an account with administrator privileges.
2. For each Color Coronis 2MP display controller installed in your system Windows will launch the "Found New Hardware Wizard". Click "**Cancel**". Continue to click "**Cancel**" until Windows stops launching the "Found New Hardware Wizard". Please be patient as this may take several minutes while Windows scans its library of Plug-and-Play device drivers to see if it has a driver for your Color Coronis 2MP controller.

3. If Windows advises you that it has finished installing all the new devices in your system and that you must reboot your system in order for the changes to take effect, click **“No”**.
4. Insert your Color Coronis 2MP Software CD into your computer’s CD drive. If the **“BarcoMed Product Installation Wizard”** doesn’t start within one minute, browse the contents of your Color Coronis 2MP Software CD and double click on the file: **“Setup.exe”** to start the wizard.

The BarcoMed Product Installation Wizard will begin by inspecting your system to make certain that all of the Windows components it needs are up to date. If they are, the BarcoMed Product Installation Wizard will display the BarcoMed Product Installation Wizard’s welcome screen (see 5 on page 33). If the screen shown in figure 5 appears, please skip to step “5.” on page 34, otherwise continue with the instructions on the next page.

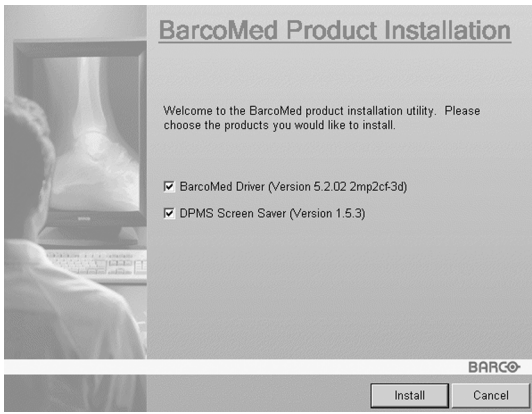


Figure 22

If it determines that the Microsoft Installer is either out of date or missing, it will display the screen shown in figure 6 below. Click **“OK”** to continue, the wizard will then install a newer version of the Microsoft Installer.



Figure 23

The BarcoMed Product Installation Wizard will advise you when it has successfully installed the new version of the Microsoft Installer. Click **“OK”**.

The Wizard may prompt you to restart your system. If it does, click **“Yes”** to restart your system now.

When your system restarts log in using an account with administrator privileges. Windows will again launch the “Found New Hardware Wizard” for each Color Coronis 2MP it finds in your system. Click **“Cancel”**. Continue to click **“Cancel”** until Windows stops launching the “Found New Hardware Wizard - Video Controller”. Again, please be patient as Windows will again scan its library of Plug-and-Play device drivers to see if it has a driver for your Color Coronis 2MP controller.

The BarcoMed Software Install Wizard will automatically restart and the BarcoMed Product Installation Wizard’s welcome screen will again be displayed (figure 7 below).

5. By default all the software on the Color Coronis 2MP Software CD will be selected. For the initial installation we recommend that you install all of the software. If you do not want to install a particular BarcoMed Software product at this time, deselect it by clearing the checkbox next to it. Click **“Install”** to continue or **“Cancel”** to exit the wizard.

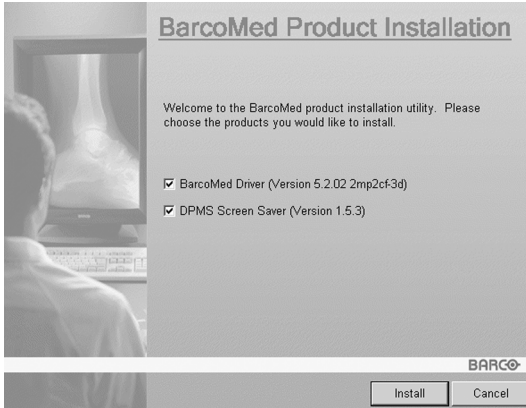


Figure 24

Driver installation

6. Click **“Next”** on the Display Driver Wizard’s Welcome Screen to continue or **“Cancel”** to exit the Display Driver Wizard and return to the Software Install Wizard.

The Device Selection Screen’s dialog box (figure 8 on page 35) should show only those devices physically installed and supported by the BarcoMed display controller driver on your Color Coronis 2MP Software CD. Select the **device** you want to install and then click **“Next”**.



Note: If there are no BarcoMed devices installed, or if Windows does not recognize the installed devices, or if the driver on your Color Coronis 2MP Software CD does not support the installed devices, the dialog box will be empty¹, and the BarcoMed driver wizard will exit when you click **“Finish”** or **“Cancel”**.

-
1. If Windows does not recognize the installed BarcoMed device, special settings may need to be made in the BIOS to support non-AGP video controllers or to support multiple video controllers. Check with your PC manufacturer.

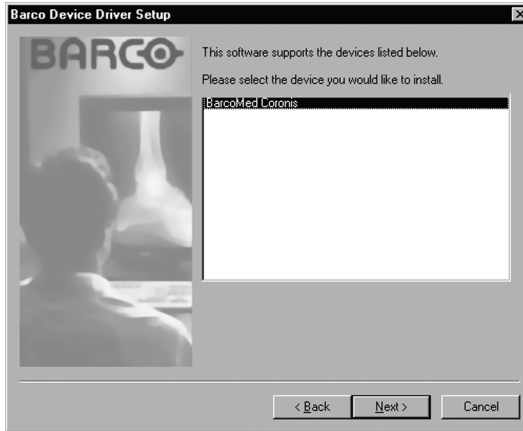


Figure 25: Sample device selection screen, the device shown in your system may be different.



Caution: You can install the driver for only one type of BarcoMed device at a time. If you have multiple types of BarcoMed devices installed in your computer, you will need to rerun the installer to install the drivers for the other devices.

If you select a device with an installed driver, the wizard will warn you if the installed driver is newer than the one you are installing (see figure 9 on page 36).

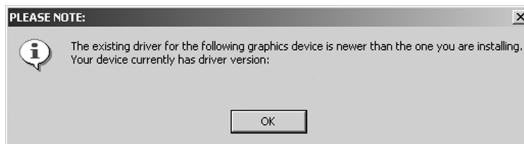


Figure 26

Click **“OK”** to install the new driver. If you don't want to replace the exiting driver, click **“OK”** and then click **“Cancel”**.

7. The “Device Confirmation” screen displays the device driver that will be installed. If you want to change your selection,

click **“Back”** to return to the Device Selection Screen. Click **“Next”** to begin installing the driver. Click **“Cancel”** to abort the driver installation.



Caution: Once you click **“Next”**, you cannot cancel the driver installation.

Prior to beginning the installation the BarcoMed Driver Install Wizard will warn you that while the driver is being installed your display may flicker. Click **“OK”** to continue.

8. When the screen shown in figure 10 below and figure 11 on page 37 appears, click **“Yes”** or **“Continue Anyway”** to continue. This screen may appear multiple times.

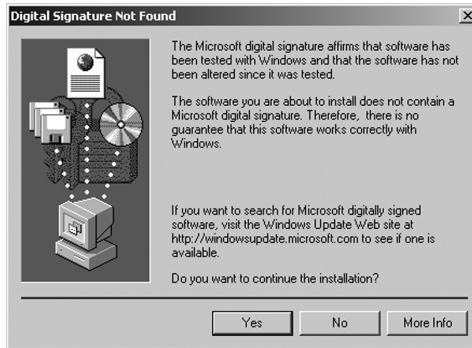


Figure 27: Windows 2000 Digital Signature Not Found Warning



Figure 28: Windows XP Windows Logo Testing Warning

When the Driver Install Wizard tells you that it has successfully installed the selected driver, click **“Finish”**.

The wizard will now begin installing the next selected piece of BarcoMed Software. If you are working with the default selections, this will be the Barco DPMS Screen Saver. Please turn to the section, **“Barco DPMS Screen Saver installation”** on page 66.

If the installation of the products you selected at the beginning is complete, click **“Finish”** to exit the BarcoMed Product Install Wizard or click **“Back”** to return to the Welcome Screen of the BarcoMed Product Install Wizard to select additional software to install. When you click **“Finish”** Windows may prompt you to restart your system, if it does click **“Yes”**. When your system restarts, boot normally and log in using an account with administrator privileges and turn to the section **“Barco monitor plug and play software”** on page 69.



Note: Clicking **“Cancel”** will also return you to the BarcoMed Product Install Wizard, but will not delete the Barco display

driver. The wizard will also begin to install the next selected piece of BarcoMed Software.

If the Wizard *failed* to successfully install the selected driver, it will warn you that the installation failed. Click **“Finish”** to return to the BarcoMed Product Install Wizard. The wizard will now begin installing the next selected piece of BarcoMed Software. Click **“Cancel”**, then click **“Yes”** then click **“Finish”**. Now **“Back”** and try reinstalling the driver following the steps above or using the steps outlined in the section **“Reinstalling or updating your BarcoMed ZMP2CF-3D driver”** on page 146.

Barco DPMS Screen Saver installation

Click **“Next”** on the Welcome Screen of the Barco DPMS InstallShield Wizard to begin the installation. Click **“Cancel”** to cancel the DPMS installation and return to the BarcoMed Product Install Wizard (figure 29 below).



Figure 29

9. The **“Customer Information”** screen will appear. The Installer will automatically fill in the blanks using the information entered when Windows was installed on your system. You

may change this information if you wish. Click **“Next”** to continue.

10. The “Setup Type” page will now appear. Choose **“Typical”** to install the default schemes with English names. Choose **“Custom”** to install the default schemes with either Dutch or German names. Currently the default schemes are not supported in the Japanese, Korean and Chinese languages. We recommend that the users of these three languages install the English default schemes and then rename and save them into their language in the DPMS configuration screen. Click **“Next”** to continue.
11. The “Ready to Install Program” page will now appear, click **“Install”** to install DPMS or **“Back”** if you wish to change any of your DPMS installation settings.

During installation the wizard will display a progress screen.

12. When the Windows Installer has finished installing DPMS, the “InstallShield Wizard Completed” page will appear, click **“Finish”** to exit the Barco DPMS InstallShield Wizard and return to the BarcoMed Product Install Wizard Welcome Screen.

After returning to the BarcoMed Product Install Wizard Welcome Screen, the wizard will clear the checkbox next to DPMS Screen Saver and will automatically launch the Barco I-Switch Software Install Wizard if the Barco I-Switch Software was selected when you began installing the software.

If the installation of the products you selected at the beginning is complete, click **“Finish”** to exit the BarcoMed Product Install Wizard or click **“Back”** to return to the Welcome Screen of the BarcoMed Product Install Wizard to select additional software to install. When you click **“Finish”** Windows may prompt you to restart your system, if it does click **“Yes”**.

When your system restarts, boot normally and log in using an account with administrator privileges and turn to the section Click **“Finish”** to exit the BarcoMed Product Installation Wizard or click

“Back” if you wish to install additional BarcoMed software. Windows may now warn you that you must restart your computer before the new settings will take effect. When you click **“Finish”** Windows may prompt you to restart your system, if it does click **“Yes”**. When your system restarts, boot normally and log in using an account with administrator privileges and turn to the section **“Barco monitor plug and play software”** on page 69.

Barco I-Switch software installation



Note: The Barco I-Switch Software is only available for systems which have the Portrait Accelerator in the Display Panel and BarcoMed Display Driver releases that include the Barco I-Switch Software. The Barco I-Switch Software may not be available for your system.

13. Click **“Next”** on the Welcome Screen of the Barco I-Switch Software InstallShield Wizard to continue the installation. Click **“Cancel”** to cancel the Barco I-Switch Software installation and return to the BarcoMed Product Install Wizard.
14. The Barco I-Switch Software must be installed on a local hard drive in order for it to function correctly. We recommend that you install it in the default location: C:\WINNT. If you wish to install the Barco I-Switch Software in a different location use the **“browse”** button on the Install Location Screen of the Barco I-Switch Software InstallShield Wizard. Click **“Next”** to continue the installation.
15. Click **“Next”** on the “Setup has enough information” screen to continue.
16. When the Barco I-Switch Software InstallShield Wizard has finished installing the software, it will tell you that it has finished installing the software on your computer and prompt you to click **“Finish”** to complete the setup. Click **“Finish”** to exit the Barco I-Switch Software InstallShield

Wizard and to return to the BarcoMed Product Installation Wizard.

17. Click **“Finish”** to exit the BarcoMed Product Installation Wizard or click **“Back”** if you wish to install additional BarcoMed software.

Windows may now warn you that you must restart your computer before the new settings will take effect.

Click **“Yes”** to restart your computer now.

Click **“No”** if you wish to restart your computer later.

When your system restarts, boot normally and log in using an account with administrator privileges and set the resolution of your Color Coronis 2MP displays.

Barco monitor plug and play software

After your system restarts and you have logged in, Windows will install the Barco Monitor Plug-n-Play software. If Windows displays the screens shown in figure 13 or figure 14 on page 40, click **“Yes”** or **“Continue Anyway”** to continue.

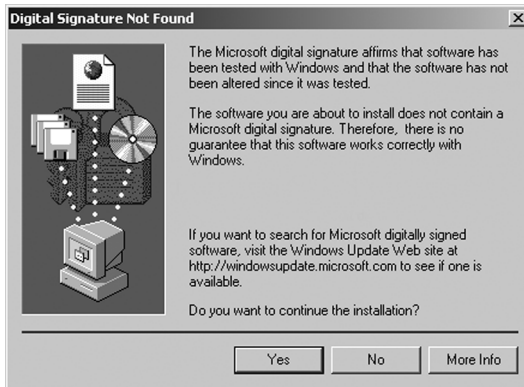


Figure 30: Windows 2000 Digital Signature Not Found Warning



Figure 31: Windows XP Windows Logo Testing Warning

The Barco Monitor Plug and Play software should automatically set the resolution for the displays of your Color Coronis 2MP System. To make active you must extend your desktop to this display using the **“Windows Display Control Panel”**. If for some reason Windows failed to correctly set the resolution of your displays please turn to the section **“Setting the resolution of your Color Coronis 2MP display”** on page 85 of the Troubleshooting Section of this manual for instructions on setting the resolution.



Display controller tools

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Barco Display Tab

Introduction

The Barco Display Tab is used for gathering information about the BarcoMed Flat Panel Display(s).

To access the Barco Display Tab do the following:

1. Open the “Display Properties Control Panel” by right clicking on the **desktop**, then select “**Properties**”.
2. Under Windows® 2000 and Windows® XP, click on the “**Settings**” tab. Double click on the rectangle that represents the BarcoMed Display you are working with to bring up its properties page. Click on the “**BARCO Display**” tab (see figure 32 below).

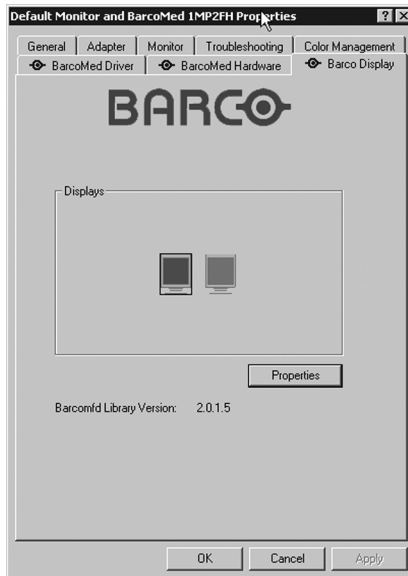


Figure 32: BARCO Display Tab under Windows® 2000 and Windows® XP

Using the Barco Display Tab

Displays

All of the available display controllers that are of the same type as the current barco display controller are shown here graphically, with one display icon representing each output of a display controller. The icon orientation reflects the display resolution. Only those outputs with a display attached to them are active. If an icon is grayed out, that indicates a output with no output attached to it. When running DualView under Windows 2000 and Windows XP the desktop *must* be extended to include each display, otherwise those outputs will not be visible to the Barco Display Tab.

Hovering the cursor over a display icon will pop up a window with information that identifies the display.

Properties

You may access the Properties page of the currently selected display, which is represented by the monitor icon above with the black frame around it, by either clicking on the **“Properties”** button or double clicking on the **icon**.

BarcoMFD library

This is the version of the barcomfd library currently used. This library provides APIs for interacting with the displays.

Display Properties

This screen (see figure 33 on page 75) shows properties of the currently active display.

Name: Displays the model name of the display.

Serial Number: Displays the serial number of the display.

Backlight RunTime: This is time in hours that the back light has been on. A common question is: How much longer will the backlight last? The backlight will typically last a very long time,

but will only be able to hold a calibrated output of 130 cd/m² for 17000 hours, after which time it will become slowly dimmer. For displays calibrated at 130 cd/m², an estimate of how long it will be before a backlight replacement is needed = 17000 hours – backlight age.

Firmware Revisions: This is the runtime firmware that is loaded in the display. This information may be helpful when there is a problem.

Internal Temperature: This is the temperature inside the display. It starts out at about the ambient temperature when the display backlight is first turned on, then rises slowly to a steady-state temperature as the display warms up. Changes in light level due to temperature variations are completely controlled by the I-Guard sensor on the front of the display.

Current Luminance Value: This is the current luminance value of the display. It may vary a bit from time to time, for the display continuously calibrates itself to meet the target luminance value.

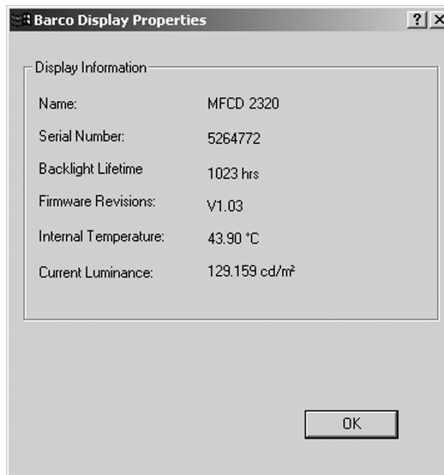


Figure 33

BarcoMed Driver Tab

Introduction

After the BarcoMed Windows display controller driver is installed, a new Display Properties tab is available for configuring special features of the BarcoMed display controller.

Languages supported

The BarcoMed Driver Tab supports the following languages:

- English (U.S) (default)
- Dutch
- German
- Korean
- Japanese
- Simplified Chinese
- Traditional Chinese

To change between the languages select the correct region via the Regional Settings Control Panel in your machine's Start > Settings > Control Panel.

Using the BarcoMed Driver Tab



Please note that you must have logged on to Windows using an account with administrator privileges in order to use the BarcoMed Tabs of the Windows Display Control Panel to change any display settings.

1. Open the "Display Properties Control Panel" by right clicking on the desktop, then select "**Properties**".
2. Under Windows 2000 or Windows XP, click on "**Settings**" tab. Double click on the rectangle that represents the Barco display whose settings you wish to change to bring up its property page. Click on the "BarcoMed Driver" tab (figure 34 or figure 35).



Figure 34: BarcoMed 2MP2CF-3D Driver Tab under Windows 2000 and Windows XP



Figure 35: BarcoMed 2MP2CP-3D Driver Tab under Windows 2000 and Windows XP

Status

The Status section displays information about the current BarcoMed display controller, driver, and the currently selected display resolution.

Graphics Board

This displays the current BarcoMed display controller.

Driver Version

This displays the current BarcoMed driver version.

Resolution

This displays the currently selected display resolution.

Drawing Modes

In the Drawing Mode section you can choose from the following Drawing Modes. If any of the options in this section are grayed out, then they are not available for the model controller with which you are working.

Enable DirectDraw

This option allows the user to enable or disable DirectDraw. DirectDraw is a software interface that provides direct access to display devices while maintaining compatibility with the Windows graphics device interface (GDI). DirectDraw provides a device-independent way for applications to gain access to the hardware features of specific display devices. If you enable DirectDraw, your application will have the choice of using DirectDraw or GDI. If you disable DirectDraw, your application will use GDI instead of DirectDraw. Please note that in any case, your application can always use BarcoMed driver functions (i.e. WinBarco) or other graphics extensions (such as OpenGL). DirectDraw is enabled by default.

Enable 3D

This option allows the user to enable or disable 3D. 3D is enabled by default.

Monitor Configuration

If the options in this section are grayed out, then they are not available for the model controller with which you are working.

BarcoMed Hardware Tab

Introduction

The BarcoMed Hardware Tab is used for gathering information about BarcoMed display controller(s). For all BarcoMed display controller(s) it will display PCI information. For BarcoMed display controller(s) based on the AURA video chipset it will also display information about the Firmware installed on the board.

Table 1:

AURA Controllers	Non-AURA Controllers	BarcoMed Hardware Tab Support
BarcoMed Nio		PCI and Firmware Information
BarcoMed Coronis		PCI and Firmware Information
BarcoMed 1MP2FH		PCI and Firmware Information
	BarcoMed 2MP1	PCI Information Only
	BarcoMed 2MP1NT	PCI Information Only
	BarcoMed 2MP2	PCI Information Only
BarcoMed 2MP2H		PCI and Firmware Information
	BarcoMed 2MP2CF-3D	PC and Firmware Information
	BarcoMed 2MP2CP	PCI and Firmware Information
BarcoMed 2MP2FH		PCI and Firmware Information

Table 1:

AURA Controllers	Non-AURA Controllers	BarcoMed Hardware Tab Support
BarcoMed 3MP2FH		PCI and Firmware Information
	BarcoMed 5MP1H	PCI Information Only
BarcoMed 5MP1HM		PCI and Firmware Information
	BarcoMed 5MP2	PCI Information Only
BarcoMed 5MP2 AURA		PCI and Firmware Information
BarcoMed Coronis 5MP		PCI and Firmware Information
BarcoMed 5MP2F		PCI and Firmware Information
BarcoMed 5MP2FH		PCI and Firmware Information

Using The BarcoMed Hardware Tab

To access the BarcoMed Hardware Tab do the following:

1. Open the “Display Properties Control Panel” by right clicking on the **desktop**, then select “**Properties**”.



Figure 36 BarcoMed Hardware Tab under Windows 2000 or Windows XP

Device

Displays the current BarcoMed display controller, driver, and the currently selected display resolution.

Information

Device ID: Displays the device’s PCI Device ID number.

Vendor ID: Displays the device manufacturer’s PCI Vendor ID number.

Subsystem ID: Displays the device's PCI Subsystem ID number.

SubsystemVendorID: Displays the device's PCI Subsystem Vendor ID number.

VGA Status: Displays whether the VGA capabilities of the BarcoMed controller are enabled or disabled.

Firmware Information

Product Name: Displays the name of the BarcoMed display controller installed in the selected PCI slot.

Serial Number: Displays the serial number of the BarcoMed display controller installed in the selected PCI slot.

VGA Bios Version: Displays the VGA Bios version for the BarcoMed display controller installed in the selected PCI slot.

Firmware Version: Displays the firmware version for the BarcoMed display controller installed in the selected PCI slot.

Hardware Version: Displays the Hardware Version for the BarcoMed display controller installed in the selected PCI slot.

"Advanced ..." Button: By clicking on this button, the user can display more information about the BarcoMed display controller installed in the selected PCI slot.

Utilities

"Generate Report" Button:

Clicking this button will launch the BarcoMed Self Exam utility. BarcoMed Self Exam is an automated Barco Diagnostic Tool that is used to gather the information that support engineers and technicians need to help determine the root cause of a customer problem. It probes the system for various types of system information, and saves it to a web-page report that can then be analyzed by the Barco ImageCare team.

BarcoMed Self Exam is implemented in a Wizard Format. The BarcoMed Self Exam Wizard will first ask the user to provide

detailed customer contact information. After completion of the customer contact information screen, the Wizard will then ask the user to provide a description of the problem, and prompt the user to enter the Medical Viewing Applications that they are using. The Wizard will then automatically collect the diagnostic information from the user's system. When completed, the Wizard will alert the user of completion and open the report. The report is saved in html format in one of two locations:

English Version of Windows®

Report will be on the desktop

Non-English Version of Windows®

Report will be in the user's directory in a folder named "desktop".

Languages Supported

BarcoMed Self Exam is currently available to run in English, German, Dutch, Japanese¹ and Simplified Chinese¹. The application will detect the regional settings on the user's machine and switch languages accordingly. The default language is English.

Welcome Screen

The Welcome screen reminds the user to close all applications before starting the wizard. The screens that follow guide the user through gathering pertinent diagnostic data that will help in determining the root of the problem.

-
1. Japanese and Simplified Chinese language support requires that both the Locale and Default System Locale need to be set to Japanese with the Japanese language pack installed. These are set in the Regional Options tool of the Windows Control Panel.

Customer Information Screen

All fields on this screen **must** be filled in. This screen asks the user for contact information that will help the Barco support team contact the customer. The user will not be allowed to move forward to the next screen unless all of the fields are filled in.

Customer Diagnostic Questions Screen

This screen allows the user to tell the Barco ImageCare team as much as possible about the problem. For the Medical Viewing Applications Running field, enter the medical applications that are currently running on the system with the problem. For the "Any Applications using DIMPL" question, select the **"radio button"** that applies to the correct response. For the "Detailed Description" field, **enter a detailed description of the problem.** And, for the Additional Notes field, enter any information that could help the Barco ImageCare team diagnose the problem.

Gathering Diagnostic Data Screen



Important: When performing the Graphics Operations, you must drag the **"Gathering Diagnostic Data Screen"** onto the display for which you want the Graphics Operations data.

This screen gathers the diagnostic data from the user's system as described above in this document. Click the **"Start Diagnostic"** button to begin the diagnostic gathering process.

To perform the graphics operations test, check the graphics operations checkbox. During the graphics operations test, several things will happen to the screen. Each graphics operation is performed for 10 seconds. To quit the graphics operations test at any time, press the Escape button.

To create a summary report for QA purposes, check the summary report checkbox. If this box is checked, an additional report will be saved on the desktop called BarcoExamSummary.txt.

Please let the wizard gather all of the data, the **"NEXT"** button will be enabled only after all of the information is gathered. Once

the information is gathered, the user may **not** go back in the wizard screens.

Completion Screen

The BarcoMed Self Exam has collected all of the information. A report called BarcoSelfExam.html with all of the diagnostic data that was collected is created. If a summary report was created, it is called BarcoExamSummary.txt. The reports are saved in one of two locations:

English Version of Windows®

Report will be on the desktop

Non-English Version of Windows®

Report will be in the user's directory in a folder named "desktop".



Note: The absolute path to the location of the BarcoMed Self Exam reports is:

under Windows 2000 and Windows XP

C:\Documents and Settings\\Desktop

Submitting the Data to Barco Support

Once BarcoMed Self Exam has collected the data, the user can submit it to ImageCare, Barco Medical Imaging Systems' customer support organization by email. To do this you need a system with access to the World Wide Web.

1. Enter the following address in your Web browser's address bar: <http://www.barco.com/medical/>
2. In the left hand column click on **"Contact us"**
3. Then click on **"Support"** in the drop down menu.
4. Find the appropriate ImageCare Center for your country and click on the **email link**.
5. Enter a **subject and a brief message** describing the problem about which you are requesting help.

6. Attach the **BarcoMed Self Exam report(s)** to the email message and send it.

You will receive an acknowledgment of receipt of your email by the end of the next business day.

The screenshot displays the Barco Medical Imaging website interface. At the top left is the Barco logo with the tagline 'Visibly yours'. A navigation bar contains links for 'Barco home', 'Products', 'Company profile', 'Jobs', 'Partners', and 'About Barco'. Below this is a 'Medical Imaging' header with a sub-link 'Barco.com > Medical Imaging > Contact Us'. The main content area features a 'Contact Us - Support Centres' section with a table listing regional offices: Americas (BarcoView LLC), Europe (BarcoView), Asia (TOYO Corporation - Japan), Barco Ltd - Other Asian countries, and Australia & New Zealand (Barco Systems - Australia). Each entry includes email, phone, and fax numbers. To the left of the contact table is a vertical navigation menu with categories like 'Medical Imaging Home', 'Press Releases', 'Events', 'Downloads', 'Application Areas', 'Partners', 'Products', 'Displays', 'Display Systems', 'Projection Systems', 'QA Software', 'Accessories', 'Support', and 'Partnerzone'. On the right side, there is a 'Website' box with a comment prompt: 'If you have comments about our web site, please send an e-mail to webmaster@barco.com.'

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Display tools

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Barco DPMS Screen Saver

Introduction

The Barco DPMS (Display Power Management Signaling) Screen Saver allows the user to set power and display saving features for medical displays controlled by BarcoMed display controllers. At the end of the work day, the display will enter certain DPMS states as requested by the display controller.



Note: The Barco DPMS Screen Saver will **not** control any displays connected to a non-Barco display controller.

The default state for the Barco DPMS Screen Saver is the Off state. In addition to simply entering the Off state after the work day, the user can specify that the display first go through two other DPMS Screen Saver states before going into Off state. These two other states for the Screen Saver are Stand-By and Suspend. The user can specify how much time should be spent in each state in the “Amount of Time in each DPMS Power State” section.

On Liquid Crystal Display (LCD) based displays, such as the Barco CORONIS displays, it is not necessary to invoke a screen saver as there is no CRT phosphor to preserve. However, one can extend the life of the backlight in the LCD display, in addition to realizing great power savings, during period of user inactivity by using DPMS to quickly enter the Off state. We recommend setting the work day to be as short as possible to get the maximum power savings on CORONIS displays.

The Barco DPMS Screen Saver can also be used when no one is logged on.

Barco DPMS Screen Saver Options

From the “Barco DPMS Screen Saver Control Panel” you can change many DPMS screen saver elements simultaneously. The DPMS screen saver elements in each scheme are work schedule, work day screen saver, DPMS settings after work day, and many additional options.

Current Scheme

Lists the three "DEFAULT" schemes which you can use as they are. Or you can modify them to meet your office's schedule.

Save As

Saves your current Barco DPMS Screen Saver settings. The name you specify will appear in the Scheme list so you can easily restore these settings later.

Delete

Deletes the scheme that is selected in the Scheme box.

Work Schedule

In this part of the control panel the user may specify the "Begin Work Day" and "End Work Day" times for each work day. If the system is not expected to be used, leave both the "Begin Work Day" and the "End Work Day" times as the same time.

Begin Work Day

The "Begin Work Day" time is the time after which the system is expected to start being used. During the work day, the screen saver selected by the user in the "Screen Saver During Work Day" section is used during user inactivity.

End Work Day

The "End Work Day" time is the time after which the system is not expected to be used any more for that day. After the work day, the display is set to one of the DPMS states (Stand-By, Suspend, or Off) by the display controller during user inactivity.

Screen Saver During Work Day

On LCD based displays, such as the Barco CORONIS displays, it is not necessary to invoke a screen saver as there is no CRT phosphor to preserve. However, one can extend the life of the backlight in the LCD display, in addition to realizing great power savings, during

period of user inactivity by quickly entering the Off state. We recommend setting the work day to be as short as possible to get the maximum power savings on CORONIS displays.

Available Savers

Lists the Available Screen Savers.

Settings

Changes settings for the selected screen saver.

DPMS Settings After Work Day

If you have an display controller that supports DPMS calls, then you will be able to set the DPMS Settings for after the work day. Otherwise, a text box will be displayed telling you why DPMS functions are not available.

Amount of Time in each DPMS State

After the work day, the display will be placed into one of the following DPMS Power States: Stand-By, Suspend, or Off. The default setting is for the display to directly go into the Off State and spend no time in the Stand-By or Suspend states. If the user wishes to go into the Stand-By or Suspend states before going into the Off state, select the required amount of time for each state.

If requested, the display will first go into Stand-By state, then into Suspend state, and then into Off state. The properties of DPMS states are listed in the following table:

Table 2:

DPMS State	Power Savings	Monitor Recovery Time
On	None	N/A
Stand-by	Minimal	Short

Table 2:

DPMS State	Power Savings	Monitor Recovery Time
Suspend	Substantial	Longer
Off	Maximum	Longest

Monitor Settings

If you have a Barco Medical Display, select “Barco Quick Start.” If a non-Barco display is being used, select the amount of time it takes your display to warm up via the “Monitor Setting” section. Contact your display vendor for this warm-up time.

On Barco CORONIS displays, the I-GUARD will stabilize the image within a few seconds after the display returns to the active state so there is no need for a warm-up time period.

Use As Logon Screen Saver

Check the box to use the Barco DPMS Screen Saver when no one is logged into the system.

Uncheck the box to use the default screen saver when no one is logged into the system.

Getting started with the Barco DPMS Screen Saver

The easiest way to get started is to select an existing settings scheme and then modify it with your preferences. Settings schemes are separated into two kinds, DEFAULT (global) and PRIVATE (personal).

Upon installation, three default settings schemes are installed and no private settings schemes are installed.

Default settings schemes are visible to all users of the system. However, they can be modified only by users with administrator privileges. If a user who does not have administrator privileges tries to save a scheme using an existing default scheme name,

an error message is displayed saying “you must have administrator rights to modify a default scheme.” If an administrator saves a scheme using an existing default scheme name, a message is displayed to tell the user that the modification is saved to a default scheme and will be visible to all users. If the administrator saves a scheme using a new name, then the user is asked if the scheme should be saved as a default scheme or a private scheme. Since there is no distinction between how a default scheme and a private scheme is displayed, it is highly recommended that the user uses a different naming convention to distinguish the two (i.e. use “DEFAULT: ...” for default schemes).

Private schemes are personal. They are not shared and are visible only to the users who created them. All users of a system, including those who do not have administrator privileges, can create, modify or delete private schemes. When the delete button is pressed, the user is asked to confirm the delete request.

Using the Barco DPMS Screen Saver

Using the Barco DPMS Screen Saver is similar to using any other Windows Screen Saver, each user of the system must select the Barco DPMS Screen Saver so that Windows will store the selection in the user’s profile. If a user does not select the Barco DPMS Screen Saver as his screen saver, the next time he logs on to the system the screen saver selection may be blank.

After selecting the Barco DPMS Screen Saver the user must then select a settings scheme for the Screen Saver to follow. To set up the Barco DPMS Screen Saver using one of the three default schemes, please do the following:

1. Open the “Display Properties Control Panel” by right clicking on an empty space of the desktop and selecting “**Properties**” from the drop down menu; then select the “**Screen Saver**” tab (figure 37 and figure 38).
1. Select the “**Barco DPMS Screen Saver**” in the “Screen Saver” drop down menu if it is not already selected.



Figure 37: Windows 2000 Screen Saver Tab



Figure 38: Windows XP Screen Saver Tab

2. Click on the **“Settings”** button. The **“Barco DPMS Screen Saver Control Panel”** (figure 39 below) will open.



Figure 39: Barco DPMS Settings Control Panel

3. Use the default schemes by selecting one of the three default schemes. Click **“OK”**. Then Click **“OK”** again.

Note: If you make any changes to any of the settings of one of the three default schemes, the Current Scheme field will blank and you **MUST SAVE** your changes by clicking on the **“Save As ...”** button. When you click on the **“Save As ...”** button, the name of the last scheme you used will be automatically displayed, you can then choose to use that scheme name or enter a new name. If you enter a name other than one of the three default scheme names, the program will ask you if you wish to save the scheme as a **DEFAULT** scheme (figure 40 below). Click **“Yes”** to save the settings scheme as a **DEFAULT** scheme, click **“No”** to save the scheme as a **PRIVATE** scheme. After you have saved the scheme, then click **OK** and the new scheme will be in effect.

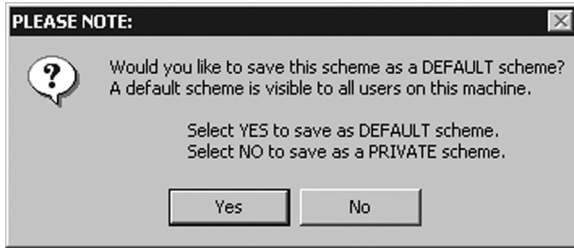


Figure 40

To create a new scheme by modifying one of the three default schemes please do the following.

1. Open the "Display Properties Control Panel" by right clicking on an empty space of the desktop and selecting "**Properties**" from the drop down menu; then select the "**Screen Saver**" tab.
2. Select the "**Barco DPMS Screen Saver**" in the "Screen Saver" drop down menu if it is not already selected.
3. Click on the "**Settings**" button. The "Barco DPMS Screen Saver Control Panel" will open.
4. Select one of the default schemes from the "Current Scheme" drop down menu.
5. Set the Work Schedule by setting the beginning and ending time of your work day for each day of the week.
6. Select the screen saver you wish to use during the work day in the "Screen Saver During Work Day" section.
7. Select the amount of time you wish to spend in the Stand-By and Suspend states after the work day has ended. Please note that after the time specified has elapsed when you are in Stand-By or Suspend, you will automatically go into the Off state.
8. Select the amount of time it takes for your display to warm up. If you have a Barco Medical Display, select "**Barco Quick Start**". If you are using a non-Barco display, select the

amount of time it takes your display to warm up via the “Monitor Setting” section. Contact your display vendor for this warm-up time. On Barco CORONIS displays, the I-GUARD will stabilize the image within a few seconds after the display returns to the active state, thus eliminating the need for a warm-up period at the beginning of the work day.

9. If you wish to use this DPMS screen saver as the screen saver at logon time, check the **“Use As Logon Screen Saver”** box in the “Additional Options” section.
10. Save your preferences by pressing the **“Save As”** button and entering a new profile name in the **“Save Profile Setting”** dialog box.
11. Apply your new scheme by clicking **“OK”**.
12. Click **“OK”** again to close the “Display Properties Control Panel”.

Installing or Reinstalling Barco DPMS

To install or reinstall the Barco DPMS Screen Saver insert the Color Coronis 2MP Software CD in the appropriate device on your computer and run the BarcoMed Product Install Wizard (please see the section Software Installation for complete instructions).

Special Note: Reinstalling the Barco DPMS Screen Saver will overwrite the DPMS configuration settings and you will need to reconfigure the DPMS settings on your system.

Uninstalling Barco DPMS

To remove the Barco DPMS Screen Saver from your system insert the Color Coronis 2MP Software CD in the appropriate device on your computer, run the BarcoMed Product Install Wizard and follow these steps.

1. Select *only* the DPMS Screen Saver on the BarcoMed Product Install Wizard’s welcome screen and click **“Install”**.

2. Click **“Next”** on the Welcome Screen of the Barco DPMS InstallShield® Wizard to begin the installation.
3. Select the radio button next to **“Remove”** on the Program Maintenance screen of the Wizard and click **“Next”**.
4. Click **“Remove”** on the Remove Program Screen of the Wizard (figure 41 below).

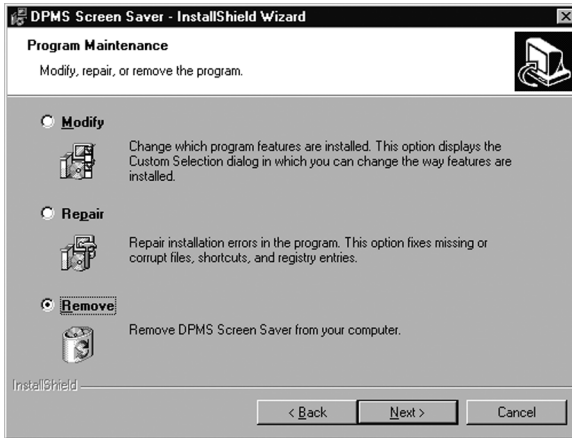


Figure 41

5. When the Wizard has finished removing the program, click **“Finish”** on the InstallShield Wizard Completed Screen of the Wizard.
6. Click **“Quit”** to exit the BarcoMed Product Installation Wizard.

Barco I-Switch Software

Overview



Note: The Barco I-Switch Software is only available for systems which have the Portrait Accelerator in the Barco Display Panel and BarcoMed Display Driver releases that include the Barco I-Switch Software. The Barco I-Switch Software may not be available for your system.

The Barco I-Switch Software is designed to detect changes in the physical orientation of the rotatable Barco flat-panel display(s) and to change the resolution of the display to match the physical orientation of the display. The Barco I-Switch Software will support up to eight Barco flat-panel displays on four BarcoMed Display Controllers. The Barco I-Switch Software supports Windows 2000 and Windows XP.

The Barco I-Switch Software is designed to react only to changes in physical orientation of the Barco flat-panel displays, not to changes in screen resolution effected from the Windows Display Control Panel. The Barco I-Switch Software functions only after the Barco Windows Display Controller Drivers have been installed, the resolution set using the Windows Display Control Panel and the Barco I-Switch Software has been installed.

Barco I-Switch Software has a limited user interface available through an icon in the system status tray. The system tray icon is just a toggle to put the service to sleep. During this sleeping phase, the Service will continue to track changes in the physical orientation. The service will use these saved settings to set the appropriate state model on startup.

BarcoMed 2MP2FC-3D or BarcoMed 2MP2CP-3D

Each head of the BarcoMed 2MP2CF-3D or BarcoMed 2MP2CP Display Controller is fully independent of the other. Rotating one head connected to the BarcoMed 2MP2FC-3D or BarcoMed 2MP2CP Display Controller will not affect the second head

connected to it. One head may be positioned in Landscape mode and the other head in Portrait mode.

Installation or Reinstallation

To install or reinstall the Barco I-Switch Software insert the BarcoMed Software CD in the appropriate device on your computer and run the BarcoMed Software Install Wizard and select only the Barco I-Switch Software (please see the section Software Installation for complete instructions).

Removal of Barco I-Switch Software

To remove the Barco I-Switch Software from your system use the Windows **"Add/Remove Programs"** utility found in the Windows Control Panel.

Or you may remove the Barco I-Switch Software from your system by doing the following:

1. Click on the Windows **"Start"** button.
2. Click on **"Run"**.
3. Type the following text in the dialog box: **"cmd"**.
4. Click on **"OK"**.
5. Type the following text in the command line window:
"coronisrotationservice /uninstall"
6. When the program has finished, closed the command line window.

Display operation

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Standard Display operation



Operating precautions

Continuous operation of the display with the same screen may result in some image sticking on the LCD panel.

Over 10 hours operation with the same image content is not recommended.

Switching on the display DPMS 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.

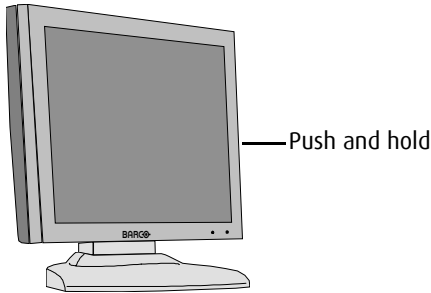


Figure 42

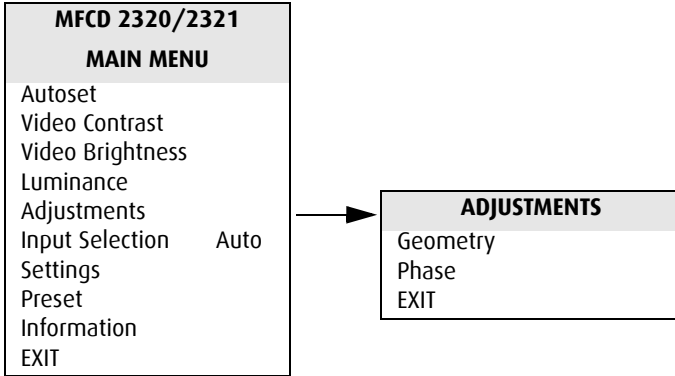
When the display is in stand-by, press control wheel to switch it back on. The LED turns green.

On-screen display (OSD)

About the on-screen display

The on-screen display (OSD) has a hierarchical tree structure, with several levels. The top level is the "Main Menu". Apart from

Input Selection, all items from the main menu contain one or more sub-menus.



Main menu and submenu

The content of the OSD depends on the selected video input: A number of functions is not present when you have selected the digital (DVI) video input, because the digital video signal requires less adjustment than the analog video signal.

It is indicated throughout this manual if a function is not present when DVI input is selected.

MFC D 2320/2321	
MAIN MENU	
Autoset	
Video Contrast	
Video Brightness	
Luminance	
Adjustments	
Input Selection	Auto
Settings	
Preset	
Information	
EXIT	

Main menu for analog video

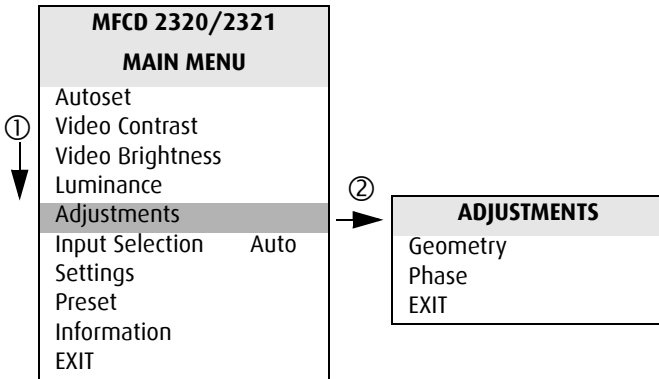
MFC D 2320/2321	
MAIN MENU	
Luminance	
Adjustments	
Input Selection	Auto
Settings	
Information	
EXIT	

Main menu for digital video

How to navigate through the on-screen display

1. When the on-screen display (OSD) is not on the screen, rotate the control wheel to display the OSD.
2. To enter into a menu, rotate the control wheel to select the desired menu.

Next, press the wheel shortly.



1. Rotate the control wheel
2. Press the control wheel
3. To exit from a menu, 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 (e.g., in contrast, brightness, luminance, some geometry and phase adjustments), 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.

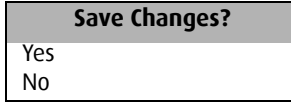
LUMINANCE	
Target Value	350 cd/m ²

When done, press the wheel shortly to confirm the change and return to the menu.

5. To select a value from a predefined list (e.g., in Settings), rotate the control wheel to select the setting and press the control wheel until the desired value appears.

How to save changes

When you have changed something and you wish to exit from the main menu, the display asks if you wish to save the changes.



1. Rotate the control wheel to select Yes (to save the changes) or No (if you do not wish to save the changes).
2. Press the control wheel to confirm the choice.

Color Temperature controls

To select a color temperature:

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 Temperature**.
5. Press the control wheel to enter the Color Temp selection menu.
6. Rotate the control wheel to select a color temperature. You can select the following color temperatures:

ClearBase	Simulation of the ClearBase film color temperature
BlueBase	Simulation of the BlueBase film color temperature
P45 Sim	Simulation of the P45 CRT phosphor color
P104 Sim	Simulation of the P104 CRT phosphor color
User	User-definable color temperature. The default factory value is 6500 K
Native White	The native, unmodified color temperature of the panel. This setting also results in the maximum possible luminance on the LCD panel

7. Press the control wheel to confirm the selection and return to the menu.

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 Temperature**.
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.
7. Click and hold the control wheel for approximately two seconds.
8. When changing the User color temperature, rotate the control wheel to select changing the color temperature in Kelvin units or x,y co-ordinates. Confirm the selection by clicking the control wheel.
9. When changing Kelvin units: Rotate the control wheel to change the value.

When changing x,y values, first rotate the control wheel to select the x or y value. Then rotate the wheel to change the value. At last, press the wheel again to confirm the change.
10. Exit the menus.



Notes:

- The *Native White* color temperature cannot be modified.
- The *User* color temperature is the only one that can be defined in Kelvin units.

- When defining a color temperature in x,y co-ordinates, it may be possible that the target luminance cannot be reached with the given settings of x,y.

The color temperature, however, will match the given x,y co-ordinates.

To reset a color temperature to the factory-set definition:

Note: Resetting a color temperature is not possible for the User color temperature.

Proceed as follows:

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 Temperature**.
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 reset.
7. Click and hold the control wheel for approximately two seconds.
8. Rotate the control wheel to select **Factory Reset Color Temp**.
9. Rotate the wheel to select **Proceed**.
10. Press the wheel to reset the color temperature to the factory-set definition.
11. Press the wheel again to return to the menu.

Note: Only the currently selected color temperature will be reset.

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
Ambient Light Compensation	Off
Color Temperature	ClearBase
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	On
Ambient Light Compensation	Off
Color Temperature	ClearBase
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	Yes
Settings	Change settings for DPMS, Power LED, User Controls 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 Phase	Adjust the video sampling phase and frequency automatically. This is necessary when you notice vertical or horizontal banding or noise in the image.
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.

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 autoset 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
Target Value	Displays the luminance value desired by the user. Change this value to manually adjust the luminance. The luminance is indicated in cd/m ² .
Measured Value	Displays the luminance actually measured by the color I-Guard, expressed in cd/m ² . When the target luminance is higher than the maximum luminance that can be produced by the panel, "Measured Value" is replaced by "Maximum Value Reached".

Luminance adjusts the overall luminance (light output) of the *display*. It does not affect the grayscales of the image on the screen.

Adjustments: Geometry

Name	Description	Available in DVI mode
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.	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
Orientation	Click to select the desired orientation for the OSD: Auto: The OSD orientation automatically follows the orientation of the display Portrait: The OSD is displayed in portrait orientation Landscape: The OSD is displayed in landscape orientation	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. For this purpose, use an even dot on-dot off test pattern. Adjust the frequency step by step until you see no vertical bands.
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 DB15 (VGA) input. Consequently, the Automatic setting will be switched off.
BNC	Select the BNC input. Consequently, the Automatic setting will be switched off. The BNC input is for monochrome video only.

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
Ambient Light Compensation	Switch on/off the Ambient Light Compensation (ALC) system
Color Temperature	Select a color temperature or change a color temperature definition

Name	Description
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.

Preset

This menu is not available in DVI mode.

For more information about the Presets, please consult the Glossary section

Name	Description
(Re)name	Change the name of the current <i>programmable</i> Preset in the memory. Rotate the control wheel to change the current character. Press the wheel to move to the next character. This function is visible only when the current Preset is a programmable Preset. The function does not appear when the current Preset is a fixed Preset.
Find next preset	Select another Preset from memory that matches the incoming video and sync signals. The number displayed in the OSD is the number of the actual Preset's memory location.

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
Hor Frequency	The currently measured horizontal sync frequency
Vert Frequency	The currently measured vertical sync frequency
Resolution	Displays the actual video signal resolution

* These functions are not available in DVI mode.

Advanced display operation

Introduction



Important

The functions described in this chapter are intended for trained service staff only!

Improper use of these functions may cause the display to not function correctly. Barco cannot be held responsible for the results or damage caused by improper use of these functions.

About the Advanced functions

The advanced functions are extensions of the standard OSD.

By default, a user browsing through the OSD sees only the standard functions. When logged in in advanced mode, the user sees the standard and advanced functions in the OSD menus.

To log in as advanced user:

1. Enter the main menu.
2. Rotate the control wheel to select the menu item EXIT.
3. Press and hold the control wheel for a few seconds until the OSD main menu is refreshed on the screen.

You have now logged in as advanced user.

Advanced functions in the Adjustments menu

Ambient Light Compensation

Name	Description
Min ALC	Contains two functions to set the minimum point of the ALC control system: Min Ambient Light: Enter the value (in Lux) of the darkest possible ambient light condition you are likely to work in. Min Luminance: Enter the value (in %) that corresponds to the display luminance you wish to get when the ambient light is at the level you have entered for Min Ambient Light.
Max ALC	Contains two functions to set the maximum point of the ALC control system: Max Ambient Light: Enter the value (in Lux) of the brightest possible ambient light condition you are likely to work in. Max Luminance: Enter the value (in %) that corresponds to the display luminance you wish to get when the ambient light is at the level you have entered for Max Ambient Light.

Low Pass Filter

This function is not available in DVI mode

The display electronics provide 4 different low-pass filters to filter possible high-frequent distortion from an *analog* video signal.

Select a different filter in case the image contains high-frequent noise or distortion. Select the filter that gives the best result.



Readjustment of sample phase is necessary after selection of a different filter.

Advanced functions in the Settings menu

Display Function

See the Glossary section for more information about display functions.

The display contains a number of factory-defined and user-defined lookup tables (LUTs) to define the display (transfer) function.

Name	Description
Native	If you select Native, a linear LUT will be selected
Dyn. Gamma 1.8	This is a gamma 1.8 function that is shifted to take into account the non-zero luminance of an LCD panel when driven with a "black" signal. It is especially useful in CT applications to improve the perception of low Haunsfield values.
Dyn. Gamma 2.2	This is a gamma 2.2 function that is shifted to take into account the non-zero luminance of an LCD panel when driven with a "black" signal. It is especially useful in CT applications to improve the perception of low Haunsfield values.

Name	Description
DICOM	Select a DICOM display function for most medical viewing applications. The DICOM function results in more visible grayscales in the images.
User	This is a user-programmable display function (dedicated software needed to define the associated lookup table)
Gamma 1.8	Select this display function in case the display is to replace a CRT display with a gamma of 1.8
Gamma 2.2	Select this display function in case the display is to replace a CRT display with a gamma of 2.2
Test	This selection is meant for internal test purposes. It should not be selected for normal operation.

Input Mode

To change the Input Mode setting, press the control wheel. Rotate the wheel to select Standard or Extended input mode. Then press the wheel again to enter the selected submenu.

The following input mode settings can be selected:

Standard input mode

Name	Description
RGB->RGB	The R video signal drives the R sub-pixels, the G video signal drives the G sub-pixels and the B video signal drives the B sub-pixels. This is the preferred setting for color display controllers.
RGB->Y	The RGB video signals from the imaging board are calculated and transformed into a single luminance value according to the formula $0.3R + 0.59G + 0.11B$. This single luminance signal drives the RGB sub-pixels of the panel equally. Use this setting in case the imaging board is a color board and if the signal must be displayed in monochrome.
R->Y	The Red video signal from the imaging board is used as luminance value to drive the RGB subpixels of the panel equally.
G->Y	The Green video signal from the imaging board is used as luminance value to drive the RGB subpixels of the panel equally.
B->Y	The Blue video signal from the imaging board is used as luminance value to drive the RGB subpixels of the panel equally.

Extended input mode

Name	Description
RBG->Y	The RGB video signals from the imaging board are calculated and transformed into a single luminance value according to the formula $0.3R + 0.59B + 0.11G$. This single luminance signal drives the RGB sub-pixels of the panel equally.
GRB->Y	The RGB video signals from the imaging board are calculated and transformed into a single luminance value according to the formula $0.3G + 0.59R + 0.11B$. This single luminance signal drives the RGB sub-pixels of the panel equally.
GBR->Y	The RGB video signals from the imaging board are calculated and transformed into a single luminance value according to the formula $0.3G + 0.59B + 0.11R$. This single luminance signal drives the RGB sub-pixels of the panel equally.
BRG->Y	The RGB video signals from the imaging board are calculated and transformed into a single luminance value according to the formula $0.3B + 0.59R + 0.11G$. This single luminance signal drives the RGB sub-pixels of the panel equally.
BGR->Y	The RGB video signals from the imaging board are calculated and transformed into a single luminance value according to the formula $0.3B + 0.59G + 0.11R$. This single luminance signal drives the RGB sub-pixels of the panel equally.

OSD position

With the OSD function you can select where on the screen the OSD menu text will appear. You can select between center position, top left, top right, bottom left or bottom right.

Advanced functions in the Presets menu

Clear user Presets

Press the control wheel if you wish to reset all the settings of all programmable (=user) Presets. In the menu that appears next, click on **Proceed** to reset the settings.

Advanced functions in the Information menu

Service

Service information is a submenu from **General Information**, containing the following items:

Name	Description
Display Name	The display type
Display Ser No	Indicates the display serial number
Display Stock No	Indicates the display order number
Panel	Indicates the flat panel serial number
Panel Prod Date	Indicates the flat panel production date

Firmware

Firmware is a submenu from General Information, containing the following items:

Name	Description
Boot Code Version	The version of the internal boot code
Run Code Version	The version of the internal run code
CPLD Code Version	The version of the internal CPLD code
FPGA Version	The version of the internal FPGA code
Mezzanine Version	The version of the internal Mezzanine circuit code
Preset Table Version	The version of the predefined Preset table

Runtimes

Runtimes is a submenu from General Information, containing the following items:

Name	Description
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
Backlight Runtime	Indicates the time the backlight has been on since the last time it was switched off (e.g., in stand-by). This counter stops after 1092 minutes.



MediCal Pro software

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MediCal Pro installation and operation

MediCal Pro software installation

Install MediCal Pro on the PC. Follow the instructions from the MediCal Pro User Guide.

Important: Do not forget you have to have Administrator privileges to install or uninstall MediCal Pro.

Using MediCal Pro

You can now use MediCal Pro to configure the complete configuration and set up the Q/A tasks.

Proceed as follows:

1. Start MediCal Pro. If appropriate, you can connect to MediCal Administrator.
2. Set up the configuration in MediCal Pro by using the Configuration Setup wizard.
3. If necessary, align the displays' geometry settings.
4. For all the displays in the system, check if the DPMS setting is turned on. Therefore, right-click on the display icon and select Properties... from the drop-down menu. Then click on Details...

Check if the Powersave option is checked. If not, check it. This is necessary to use the DPMS possibilities of the display controller.

5. For all the displays in the system, define (if necessary) and select a Preset.
6. After selecting the Preset, MediCal Pro starts consistency calibration automatically.
7. Define the Q/A task schedule.

8. Run the due tasks.

Please refer to the MediCal Pro User Guide for more information.

Cleaning instructions

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Precautions



Precautions

- Take care not to damage or scratch the glass or LCD panel.
- Do not apply pressure on the glass or LCD panel.
- Do not apply or spray liquid directly to the glass, panel or cabinet as excess liquid may cause damage to internal electronics. Instead, apply the liquid to the cleaning cloth.
- DO NOT USE:
 - Lye or cleaning solutions containing lye*
 - Acid
 - Detergents with fluoride
 - Detergents with ammonia
 - Detergents with abrasives
 - Steel wool
 - Sponge with abrasives
 - Cloth with thread made of steel
 - Other coarse tools

*(Lye is a strong caustic alkaline solution of potassium salts.)

Front glass

Proceed as follows:

- Clean the glass using a soft cotton cloth, lightly moistened with a watery solution or a mild commercial glass-cleaning product suited for coated glass surfaces.
- Wipe dry with a dry cloth.

Cabinet

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) and Aquasonic Gel.

LCD panel

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.
- 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 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 may be normal (inherent in LCD technology)
Image contains not enough grayscales	<ul style="list-style-type: none"> • Adjust the Display Function to DICOM by means of the OSD. • You may have installed the driver software with an inappropriate selection of Palette Settings (Static Gray with or without System Colors). Install the driver software again using a different setting for Palette Settings.
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 PCI / AGP connector

Problem description	Possible tests or solutions
No image during PC start-up	<ul style="list-style-type: none"> • Check the VGA jumper settings on the display controller • Check the CMOS settings in the PC BIOS
Nothing happens when you press or rotate 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"> • Select another resolution in the Windows "Display Properties" control panel
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 the display DPMS may decrease the risk of image sticking. • A slight case of image sticking can be solved by continuously displaying a full white image during a number of hours.
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

Windows 2000 display resolution



Tip: These instructions apply to both **Windows® 2000** and **Windows® XP**.

Setting the resolution of your Color Coronis 2MP display



In order to set the resolution of your Color Coronis 2MP display you must be logged in using an account with administrator privileges.

1. To set the resolution of your Color Coronis 2MP display(s) right click on the **desktop** and select **“Properties”**.
2. Select the **“Settings”** tab.
3. Select the **rectangle** that represents the first Color Coronis 2MP display attached to the BarcoMed 2MP2CF-3D display controller you are working with.
4. click Click on the **“Advanced”** Button.
5. Select the **“Adapter”** tab and then click on the **“List All Modes”** button. Select the resolution and refresh rate that your Color Coronis 2MP display supports from the dialog box and click **“OK”**.
6. Click **“OK”** on the bottom of the Adapter Control Panel. If the **“OK”** button on the bottom of the Adapter Control Panel is not visible, press the **“TAB”** key once and then press **“CTRL”+“Enter”** to select **“OK”**.
7. Click **“OK”** in the “Windows will now apply your new desktop settings” dialog box. Your Color Coronis 2MP display should now synchronize and display the Windows desktop.
8. Click **“Yes”** when asked, “Your desktop has been reconfigured. Do you want to keep these settings?”

To set the resolution of the second display attached to the BarcoMed display controller you are working with, go back to the **“Settings”** tab of the **“Display Properties Control Panel”**. If

necessary attach the second display by right clicking on the rectangle that represents it and selecting **“Attached”**.

Now repeat steps 4–8 above for this display.

If you are using a Quad-Head Configuration repeat all of the above steps for the two displays on the second display controller.



Caution: if you have a single display configuration and you have enabled DualView, Windows will not allow you to attach the second head. This is normal and not a bug.

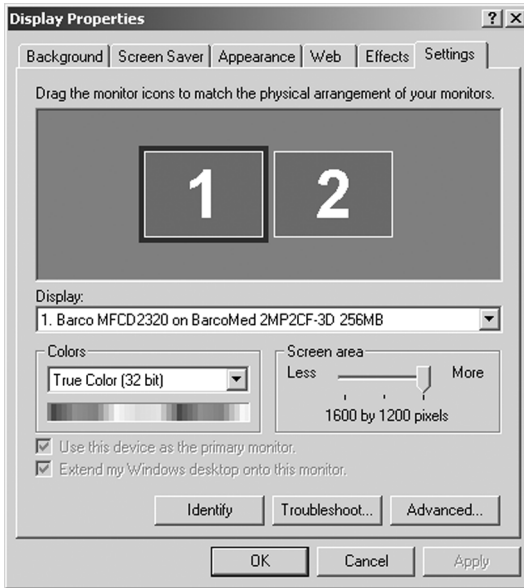


Figure 43: The Windows Display Properties Control Panel Settings Tab after the drivers have been installed and the resolution set with DualView Enabled.

Note: The system shown in figure 43 above is a dual-head, single BarcoMed 2MP2CF-3D display controller, without a 3rd party VGA controller configuration. Your system may look different.

Driver re-installation, updates or removal

Reinstalling or updating your BarcoMed 2MP2CF-3D driver



Note: These instructions apply to Windows 2000 and Windows XP.



Important for Windows 2000 or Windows XP users only: If you previously uninstalled the driver, do **NOT** allow the Windows Plug and Play software to reinstall the driver for you.

To reinstall or update only the BarcoMed 2MP2CF-3D driver, follow the steps described in the section **“Using the BarcoMed Product Installation Wizard”** with the following changes.

1. Boot your system, and log in using an account with administrator privileges.
2. Insert your Color Coronis 2MP Software CD into your computer’s CD drive. If the **“BarcoMed Product Installation Wizard”** doesn’t start within one minute, browse the contents of your Color Coronis 2MP Software CD and double click on the file: **“Setup.exe”** to start the wizard.

The wizard will begin by displaying the screen shown in figure 44 below.

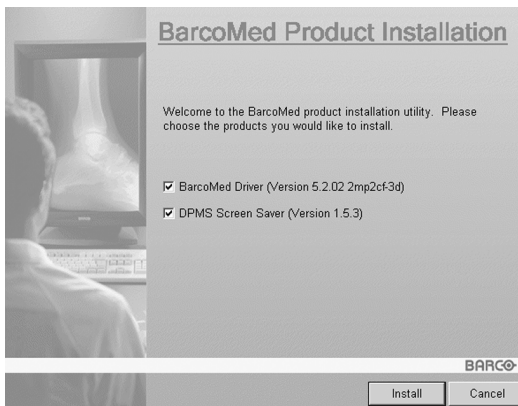


Figure 44

3. To update the driver, clear the checkbox next to (see figure 45 below) and click **“Install”**.

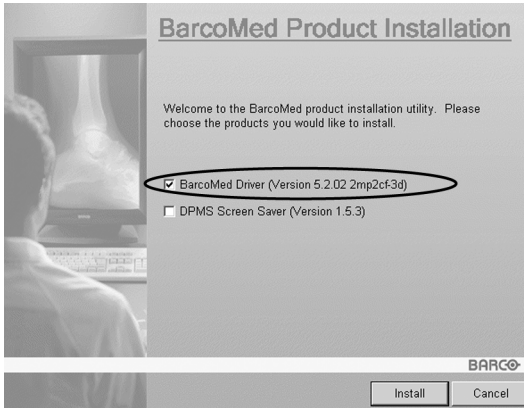


Figure 45

4. For **Windows 2000** or **Windows XP** please turn to Step 6 on page 62 in the section titled **“Software installation”** and follow the instructions to finish reinstalling or updating your BarcoMed 2MP2CF-3D driver.

When the driver has finished installing, click **“Finish”**. Then click **“Finish”** again.

Reboot the system when prompted and then reset the resolution of your displays if necessary.

Uninstalling the BarcoMed 2MP2CF-3D driver



To remove the BarcoMed 2MP2CF-3D display controller driver from your system you must be logged in using an account with administrator privileges.



Special Note: The BarcoMed Uninstaller is supported only on Windows 2000 and Windows XP.

Uninstalling the BarcoMed 2MP2CF-3D driver

1. Insert your BarcoMed 2MP2CF-3D Software CD into your computer's CD drive. If the **"BarcoMed Product Installation Wizard"** doesn't start within one minute, browse the contents of your Color Coronis 2MP Software CD and double click on the file: **"Setup.exe"** to start the wizard.
2. The BarcoMed Product Installation Wizard will display its welcome screen.
3. Make certain that the checkbox next to the driver is checked and that all other checkboxes are unchecked (figure 46 below). Click **"Install"** to continue.

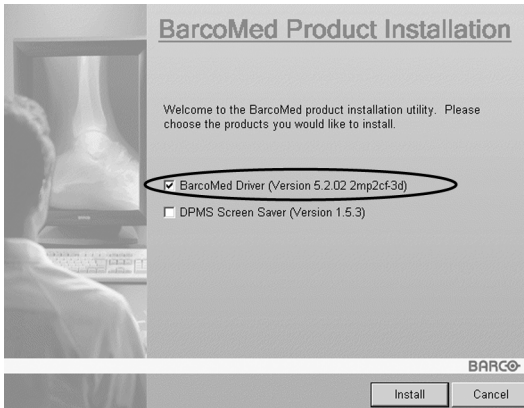


Figure 46

4. Click **"Next"**.
5. On the next screen (see figure 47 on page 149), **check** the checkbox next to "Uninstall this device" and click **"Next"** to continue.

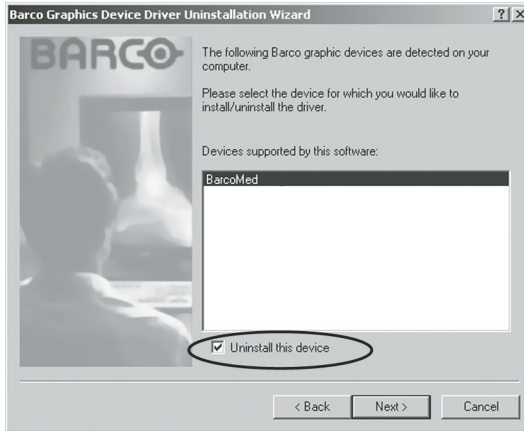


Figure 47

6. Click **“Next”**.
7. If you installed your driver with DualView **enabled**, skip to step 8.

If you installed your driver with DualView disabled, click **“Next”** to continue. Then click **“Finish”** to complete the uninstall process. Click **“Finish”** again to exit the wizard. Click **“Yes”** if Windows tells you that “you must restart your computer before the new setting will take effect”.

8. If you have installed your driver in DualView mode the wizard will warn you that you must first disable DualView by rebooting and then run the uninstall program again.



Figure 48

Click **“OK”** to continue.

9. Click **“Reboot”** to disable DualView, click **“Finish”** to exit the wizard and then click **“Yes”** to reboot your system.



10. When your system restarts, log in again using an account with administrator privileges. DualView should now be disabled.
11. The **“BarcoMed Product Installation Wizard”** should automatically restart. Finish uninstalling the driver by clicking **“Next”** three times. Then click **“Reboot”**, **“Finish”** and **“Yes”**.

If the **“BarcoMed Product Installation Wizard”** doesn't automatically restart, finish uninstalling the driver by restarting the **“BarcoMed Product Installation Wizard”** by browsing the contents of your Color Coronis 2MP Software CD and double clicking on the file: **“Setup.exe”**. Then follow Step 3 on page 148 through Step 7 on page 149 to finish uninstalling the driver.



Technical Information

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Technical specifications

MFCD 2320/2321:

Item	Specification
Picture panel	MFCD 2320: 20.1-inch MFCD 2321: 21.3-inch diagonal viewable screen TFT (thin film transistor) active matrix, color liquid crystal display
Resolution	Native: 1600 x 1200
Display area (H x V)	MFCD 2320: 408 x 306 (mm) MFCD 2321: 432 x 324 (mm)
Viewing angle (@ 10/1 contrast)	Vertical: 170° Horizontal: 170°
Pixel Pitch	MFCD 2320: 0.255 mm (H) x 0.255 mm (V) MFCD 2321: 0.27 mm (H) x 0.27 mm (V)
Native color resolution	8 bits / sub-pixel
Luminance	130 cd/m ² (calibrated) 180 cd/m ² max in Native White color temperature
Contrast ratio	MFCD 2320: 350/1 MFCD 2321: 400/1 (Typical, on/off in dark environment)
Response time	MFCD 2320: 12.5 ms typical MFCD 2321: 25 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, BNC (monochrome only)
Signal systems	DVI Digital, RGB Analog

Item	Specification
DVI compliance	Complying to DVI Rev 1.0 specifications
Input signals	Possible resolutions: <ul style="list-style-type: none"> • 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	75 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	13.9 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:

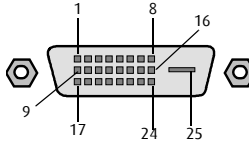


Figure 49: DVI connector pin layout

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:

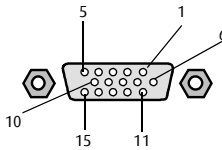


Figure 50: D-Sub 15 pin layout

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		

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

BarcoView 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 BarcoView 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 BarcoView Customer Support Center (or an authorized service center) for repair activities. The Customer shall ask for a RMA or RAN number to a BarcoView 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 BarcoView 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 BarcoView (or an authorized service center) shall become the property of BarcoView (or the authorized service center).

1.5 The repaired equipment shall be returned to the Customer, by regular freight, at BarcoView'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 BarcoView or their official agent or distributor and integrated by Customer or a third party into BarcoView supplied equipment.

2.2 Any host configuration not explicitly supported by BarcoView.

2.3 All software installed on the system, whether they are acquired from BarcoView or third party. An exception is made for software delivered by BarcoView 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 BarcoView performance of its requirements under the warranty condition; failure by Customer to meet its

obligations under this paragraph shall excuse BarcoView's performance hereunder:

3.1 Customer shall not expose BarcoView 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 BarcoView equipment in an environment for which it was intended. If there is an indication that the equipment was used - even temporary - outside its specifications, BarcoView is entitled not to perform warranty repairs and terminate the warranty agreement. Any actions that have been taken by BarcoView 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 BarcoView.

Any attempt to do so, voids the warranty.

ARTICLE 5: DISCLAIMER OF WARRANTIES

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

ARTICLE 6: LIMITATION OF LIABILITY

Barcoview 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 BarcoView 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 BarcoView 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 BarcoView 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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