RHDM series

High-Definition reference monitors

For broadcast and post-production professionals who are performing color-critical work on a daily basis, Barco has developed the RHDM series High-Definition reference monitors. Available in a 17" and 23" version, the RHDM has been designed to suit the needs of all aspects of today's professional broadcasting - including camera shading, field productions, mixing and master control, color correction, post-production and editing. As true Grade-1 LCD displays, Barco's RHDM series bring amazing color accuracy, image stability and motion handling.

BARCO

Visibly yours


Camera 3

High-Definition reference monitors

Barco's RHDM-1701 and RHDM-2301 bring LCD technology of the highest professional standards, including a true 10-bit, 120Hz flat panel, scanning RGB-LED backlight technology, embedded calibration and stabilization technology, and unique 48-bit color processing. All these features ensure a color performance and image quality level that is unseen in broadcast and post-production environments. Be it for camera or lighting professionals, editors, colorists or post-production staff, anyone who is highly demanding about colors will value Barco's RHDM series as indispensable references.

Colors that last

While traditional reference monitors need to be recalibrated at least weekly, the RHDM-family will keep their colors lasting for months on end. Barco's reference monitors feature advanced **calibration and stabilization technology**, integrated into the display's electronics, which tracks color performance in real time and corrects for any changes related to temperature and aging.

Excellent motion handling

With Barco's RHDM series displays, you can do full justice to the action scenes you produce. Thanks to the **high-speed 120 Hz panel,** proprietary **LCD speed-up algorithms** and **scanning RGB-LED backligh** technology, the RHDM series prevent motion blur and judder. Additionally, a **black line-insertion** algorithm presents native interlaced images without any de-interlacing artifacts. This results in excellent motion handling and lifelike motion scenes with a CRT-like quality.

Color accuracy

At Barco, we understand the complexity of color. And just like many other color-critical professionals, we understand that judging color is an every-day challenge. The RHDM-1701 and RHDM-2301 combine Barco's long-standing expertise in the field of color accuracy with the most recent and cutting-edge technology around, such as the RHDM series' native **10-bit** panel (22-bit with proprietary dithering), calibrated **RGB-LED backlights**, unique **48-bit processing** and embedded 3D-LUT cross-talk compensation.

The reference for broadcast professionals
RHDM-B series

RHDM-1701B and RHDM-2301B are reliable references for master control rooms, camera control, camera shading, signal quality checks, technical rooms etc, both in TV studios as well as OB vans.

Technology highlights:

- Supports all standard SD and HD-SDI signal
- Optional Dual Link
- Optional 3Gb/s HD-SDI
- Supports TSL 3.1 and 4.0 serial tally/UMD protocols

Camera control/shading
At the time of shooting, Barco's RHDM-B series are the reliable references for program directors, colorists and camera and lighting staff. During real-time color judging, the RHDM-B series provide continuous color stability, perfect representation of grayscales, deep darks and correct pastel tones. The split-screen functionality helps compare and adjust two cameras or other sources side by side on the same monitor with the highest picture quality. The monitors also support In-Monitor Display functionality and two tally lights on the actual LCD, hereby saving valuable rack space.

Field productions
In OB vans and ingest & transmission monitoring environments, RHDM-1701B and RHDM-2301B users benefit from the display's robustness and system stability. The RHDM-B series can easily withstand temperature cycling conditions, so that frequent calibration is not necessary. They also feature various modes for video handling and motion blur reduction, which allows to correctly judge fast moving scenes.

Mixing and master control
In preview and master control environments, the RHDM-B series are the most reliable and stable reference for source quality validation and for program and output monitoring. The monitors also support In-Monitor Display functionality and two tally lights on the actual LCD.

Editing
Barco's RHDM-B series provide the most reliable colors and CRT-like image speed. The monitor latency is always presented on the on-screen display, allowing sound editors to work more efficiently.

Technical room
For delivery and ingest monitoring, Barco's RHDM-B series offer a stable reference for color grading and speed judgments across different workflows.

Transport formats
The RHDM-B series are ideal display solutions for checking HD to SD conversions and decompression artifacts. The displays offer a de-interlace and native interlaced handling option, which allows validating multiple application formats.

Tally & UMD control
Dynamic Under Monitor Display (UMD) control with the TSL protocol and tally lights show valuable indications to anyone working in a television studio, being it in front of or behind the camera. Barco's RHDM series support both, either on spare areas on-screen (RHDM-2301), or in overlay mode over the picture (RHDM-1701).

The reference for film and post-production professionals
RHDM-P series

Film acquisition
The RHDM-P series are the perfect reference monitors for Directors of Photography (DoP) on set during film acquisition, as well as for dailies processing. The Grade-1 color accuracy and stability means that two RHDM-P series monitors will show identical pictures even on two distant sets. The support of 3D-LUTs allows a better preview, pre-post and faster creative decision making on set.

Film scanning and telecine
Film scanners and telecine specialists will benefit from the RHDM-P series' high contrast range, black detail and stabilized wide color gamut capabilities.

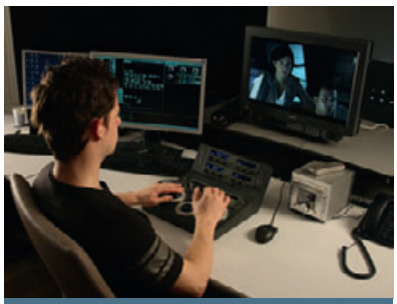
Color grading
The RHDM-1701P and RHDM-2301P offer color grading specialists a high contrast and excellent black detail, a smooth picture without banding artifacts and accurate, CRT-like colors. With the RHDM-P series, the film grain and other dark details are shown just as they are – not hidden or extremely accentuated. The support of a custom 3D-LUT allows accurate print-film emulation.

Visual effects
Scanning RGB-LED backlight technology, a 120Hz LCD panel and native interlace mode make the RHDM-P series an excellent reference for motion handling.

DVD and Blu-ray mastering
The RHDM-P series are reliable references to validate a digital intermediate and its derivatives (DVD, Blu-ray, digital cinema masters etc.)

3D-LUT support
Reference monitors used in post-production of feature films need to visualize how a final film print will look like. In order to simulate this, a 3D-LUT must be applied to the input signal, either in an external processor, or internally in the monitor. Barco's RHDM-P version is able to handle custom 3D-LUTs. Formats from Filmlight, Cinespace and Autodesk are now supported as a standard feature.

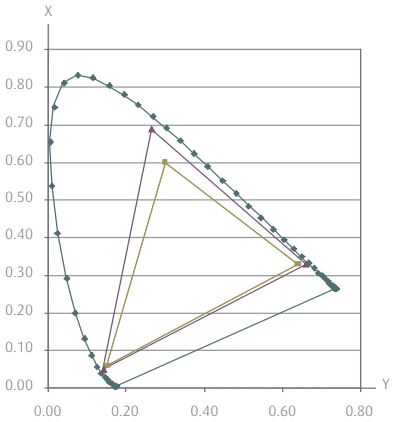
Barco's RHDM-1701P and RHDM-2301P are ideal references for a wide range of film and post-production applications: on-set and dailies viewing, film scanning and restoration, various digital intermediate (DI) processes such as color grading, visual effects (VFX), computer generated images (CGI) and digital film mastering, as well as post-production of trailers, commercials, music etc.



Technology highlights:

- Supports Dual Link HD-SDI
- Supports 3Gb/s SDI
- Custom RGB primaries in (x,y)
- Supports custom 3D-LUTs

Technology making a difference



Wide color gamut
Rec.709
LED

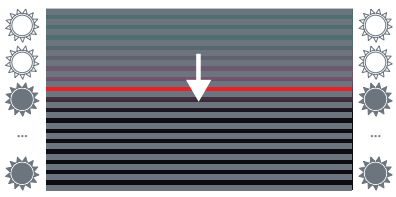
Wide color gamut

Barco's RHDM-family has **RGB-LED backlights** with separate red, green and blue LEDs. This results in a wide color gamut (wider than required for Rec.709). This color gamut is then transformed to the required display gamut (e.g. Rec.709, SMPTE, EBU).

Worry-free auto-calibration

To counteract the effects of ambient temperature and backlight aging, the RHDM series have **integrated calibration and stabilization technology**, including a spectrometer, various color sensors and temperature sensors. This means that the displays' colors and white point are constantly monitored and corrected in real time in case of imperfections. What's more, there is no need to recalibrate the monitors for at least a one-year period.

Via an easy user interface, the embedded spectrometer enables manual control of the display white point in actual (x,y) coordinates. In the RHDM-P versions, also the primaries can be adjusted so that film post-production users can benefit from the large LED gamut. The white point balancing is directly performed on the backlight. Unlike typical R-G-B gain controls in traditional monitors, the contrast is preserved and no display levels are discarded. Manual calibration is as simple as typing in the required white-point color coordinates, for example those measured on a CRT.



Scanning backlight system
Stable pixels, latest frame
Still switching
Latest scanned row
Pixel information from previous frame

Motion blur prevention

Traditional LCD monitors present blur artifacts as a result of the deinterlacing mode, which typically builds up the image in a line by line drawing process. Barco's RHDM series counteract this by **reducing the 'hold' effect** created by LCDs. First of all, the monitors have a fast **120Hz panel**. In addition, the RHDM series' **scanning backlight system** makes sure that only the stable LCD information is illuminated.

Finally, to avoid the typical de-interlacing artifacts, the RHDM-family also allows for **black line insertion** for **native interlaced representation**. In practice, this means that each field of interlaced video (odd and even) is displayed separately and the corresponding second fields are blanked with black lines.

Technical specifications

RHDM-2301 display:
- Active area RHDM-2301: 22.5" (57 cm)
- Resolution RHDM-2301: 1920x1200
- Contrast RHDM-2301: typical 800:1
- Panel drive: 96-120Hz, 10 bit native, 22 bit dithered

RHDM-1701 display:
- Active area RHDM-1701: 16.53" (42 cm)
- Resolution RHDM-1701: 1920x1080
- Contrast RHDM-1701: typical 1000:1
- Panel drive: 96-120Hz, 10 bit native, 22 bit dithered

Optical:
- Wide gamut RGB-LED backlight
- Selectable white points: D55 – D65 – D75 - D93 [default: D65]
- Selectable gamma 1.0 - 3.0 [default: 2.35 –EBU/SMPTE compliant]
- RHDM-P series also allows selecting custom R, G and B primaries.

Calibration and stability:
- Compliant with EBU, SMPTEC and ITU BT.709 primaries
- Deep level, 3D-LUT factory calibration
- Thermal sensor circuit for LED stabilization with temperature
- Embedded spectrometer for overall color stabilization over time
- Embedded special sensors for LED uniformity and color stability over time
- Front sensor for real-time corrections (RHDM-2301 only)

Processing:
- 48 bit color processing (16 bit per color)
- 96-120 Hz native LCD driving (prevents motion judder, genlocks to all inputs)
- Genlock and frame sync
- Slow or fast sync selection
- Color-stabilized scanning LED backlights for motion blur prevention
- Motion adaptive de-interlacing
- Interlaced driving (black-line insertion) for CRT-like motion quality
- Quantified latency (depending on scanning mode)

Connectivity:
- Modular input configuration: 4 slots
- Standard delivered with 1 SDI module
- Space for additional:
  - 1 x SDI module
  - 2 x DVI input modules

SDI module:
- Input/output card supporting 2x SD-SDI or 2x HD-SDI
- 3Gb/s and Dual Link inputs are standard on RHDM-P series and optional on RHDM-B series.

Supported signal standards:
- SD-SDI 576i/480i (ITU-R BT.601)
- HD-SDI 1080p/pSf at 30, 29.97, 25, 24 and 23.98 frame rate (SMPTE 274M)
- HD-SDI 1080i at 60, 59.94 and 50 Hz field rate (SMPTE 274M)
- HD-SDI 720p at 60, 59.94, 50, 30, 29.97, 25, 24 and 23.98 frame rate (SMPTE 296M)
- 3Gb/s and Dual Link HD-SDI (SMPTE 372M, 425M) are standard on RHDM-P and optional on RHDM-B

Functions:
- Safe area and aspect ratio markers
- User selection of working color space (color temperature, gamma, gamut)
- R-G-B-monochrome channel selection
- Extended aspect ratio and scaling factor selection
- Split-screen mode with zooming and panning per displayed input (for multiple camera color correction)
- In-Monitor-Display (IMD) and 2 in-monitor tally lights controlled remotely (TSL v.3.1 and 4.0)

Control:
- Detachable front control panel with main functions (RHDM-2301 only)
- Ethernet interface with web server and TCP/IP interface
- RS485 serial IMD and tally control
- RS485 parallel GPIO for tally control
- USB: for firmware and license upload via mass-storage devices

Track ball for on-screen display, panning & zooming, and split screen functionality

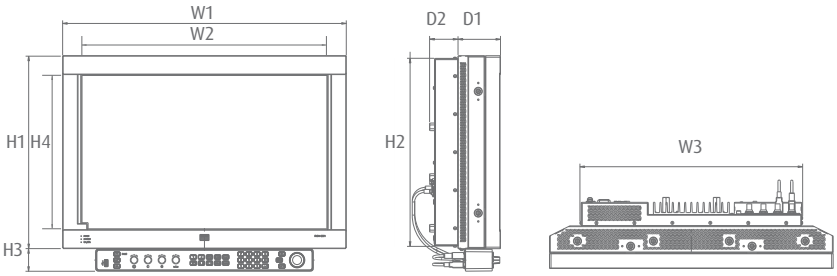
Front sensor for real-time corrections (RHDM-2301 only)

Power & environmental:
- Power consumption: nominal 150W
- Input voltage: 85-264 VAC, 47-63 Hz
- Operating temperature: 10-40 °C (50-104 °F)
- Dust class: 8 according to ISO14644-1 (in operation).

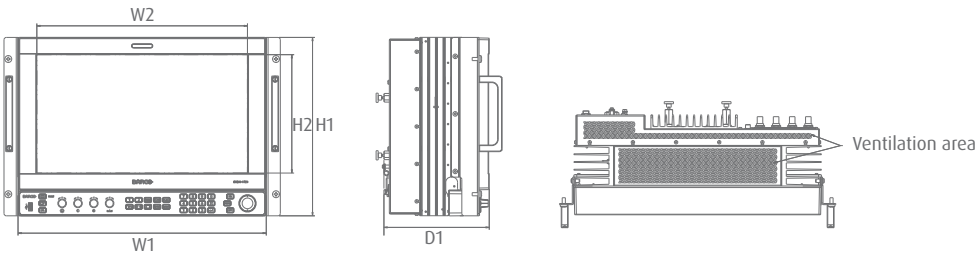
Easy integration:
Barco's RHDM series displays are optimized for easy integration into TV studios and OB vans. Thanks to a well-studied mechanical connection system, the display can be easily built into racks with easy access to the input connectors. The display's reduced width and depth also make it an ideal solution for environments where space is limited.

Dimensions

RHDM-2301	Front	Rear	Total
Width	561 mm | 22,09″ (W1)	441 mm | 17.36″ (W3)	561 mm | 22.09″ (W1)
Height	381 mm | 15″ (H1)	375 mm | 14.76″ (H2)	381+44mm |15″+1.73″(H1+H3)
Depth	84 mm | 3.31″ (D1)	56 mm | 2.20″ (D2)	140 mm | 5.51″ (D1+D2)
RHDM-2301			
Width active screen		483.84mm | 19.04″ (W2)	
Height active screen		302.4mm | 11.91″ (H4)	
Weight		20.5 kg | 45.2 lb	



RHDM-1701	
Width	430 mm | 16.93″ (W1)
Height	310 mm | 12.2″ (H1)
Depth	182.95 mm | 7.2″ (D1)
Width active screen	365.9 mm | 14.41″ (W2)
Height active screen	205.7 mm | 8.1″ (H2)
Weight	14 kg | 30.86 lb



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