
Lambda 23 VF PM (N)

ECDIS / RADAR

Typ: BPM 723-DA / BPM 723- RDA

23.1" ECDIS / RADAR / IEC 60945

Type Approved Maritime Display

Technical Specifications

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Technical Specifications (English) Lambda 23 VF PM (N) ECDIS / RADAR
Typ: BPM 723-DA / BPM 723- RDA, Version 4.1, November 29 - 2011

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1. INTRODUCTION

First, we would like to thank you for purchasing one of our products.

This Technical Specifications describes the **Lambda 23 VF PM** ECDIS (Typ: BPM 723-DA) and **Lambda 23 VF PM** RADAR (Typ: BPM 723-RDA) **(N)** Nautic Displays. Our products meet the Standards for Marine applications.

The Displays are equipped with high performance 23.1" (in diagonal) color TFT flat panels with UXGA (1600 x 1200 pixels) maximum resolution with up to 16 million simultaneous colors.

The full aluminum housing takes care for good temperature dissipation, high ESD and EMI protection and mechanical longevity. The electrical and mechanical components corresponds the highest requirements and quality standards.



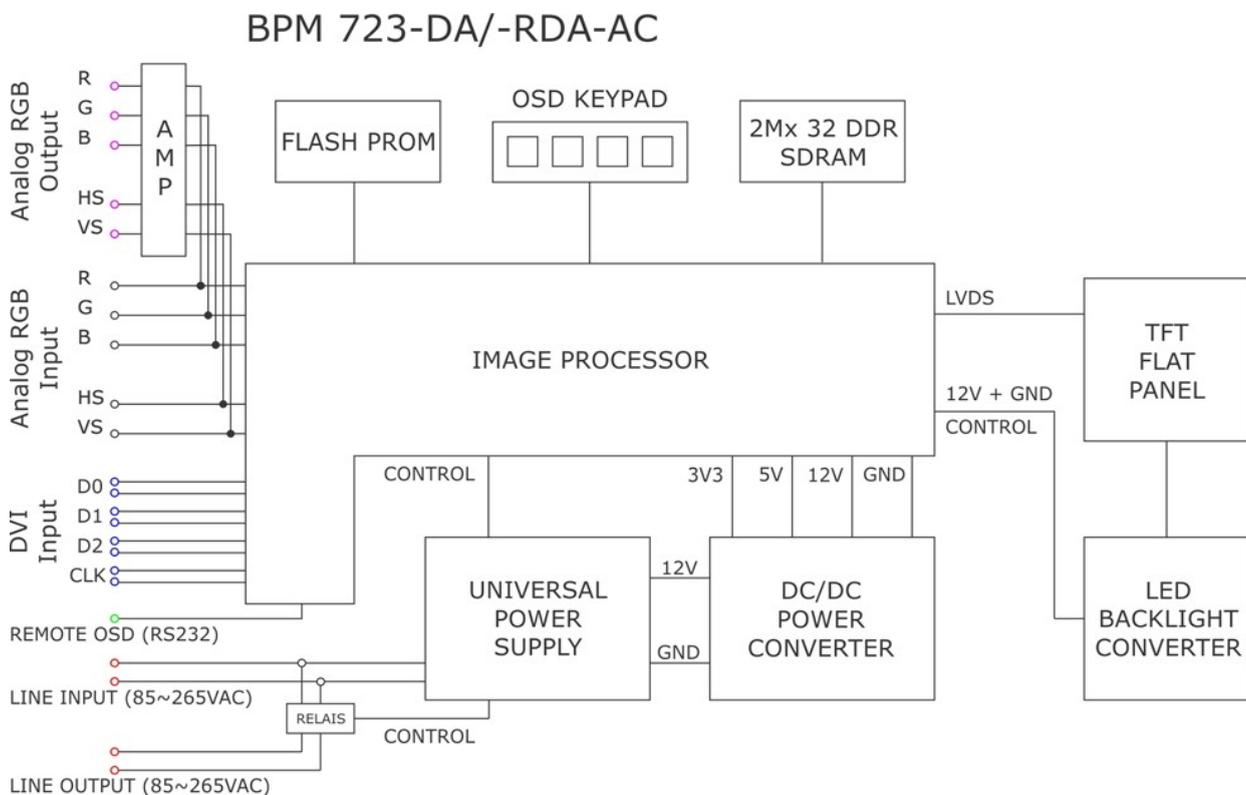
Picture 1
Lambda 23 VF PM (N) ECDIS Display (with old OSD keypad colors)

Brief Description

The **Lambda 23 VF PM (N)** ECDIS Monitor is prepared to interface usual analog RGB and DVI signal sources. The analog RGB input specification operates with standard VGA up to UXGA signals (digital H-Sync. and V-Sync.), RGB with Composite Synchronization on Horizontal, and RGB with Composite Synchronization on Green signal sources.

The **BayView AD5** converter card are be designed with the most advanced technology and converts the analog input signals to high quality 24-bit digital LVDS flat panel output signals (3x 8-bits, 16.7 million colors). The integrated auto-scaling feature scales the input signals automatically to the flat panel resolution, in this case to 1600 x 1200 pixels. The sophisticated auto-tracking and auto-phasing features adjust the input picture automatically to the flat panel resolution and timing, no manual picture positioning adjustments are necessary. During the APT (Auto Phase tracking) signal measurement phase, the picture can be trembling or freezing during a short time. Independently, it is possible to adjust the picture in manual form by using the OSD menu. All monitor adjustments has saved in a non-volatile RAM. The converter Firmware recognizes automatically the actual input signal characteristics and takes the appropriate parameters from the RAM.

The On-Screen-Display (OSD) allows most of the monitor adjustments, as an example: contrast, brightness, color, backlight brightness, manual picture positioning, auto-scaling sharpness, etc. The OSD menu can also handle remotely over the RS-232 serial port (ACK / NACK protocol). The units are available with a universal AC power supply or with a wide range 24V DC-Power (DC/DC converter) as option.



2. SPECIFICATIONS

2.1 Optical and Electrical Specifications

2.1.1 LCD Screen Specifications

2.1.1.1 LCD Panel Technology

- Active Matrix Liquid Crystal Display (AM-LCD) technology
- Amorphous silicon TFT (Thin Film Transistor) technology
- LED Backlight technology

2.1.1.2 Screen Dimensions

- Aspect ratio: 4 : 3 (Landscape format)
- Active screen size: 470.4 (H) x 352.8 (V) mm (18.519" x 13.882")
590 mm (23.1")

2.1.1.3 Screen Resolution

- 1600 (H) x 1200 (V) pixels
- Pixel arrangement: RGB (Red dot, Green dot, Blue dot) vertical stripe
- Dot pitch 0.098 (H) x 0.294 (V) mm (0.0038" x 0.011")
- Pixel pitch: 0.294 (H) x 0.294 (V) mm (0.011" x 0.011")

2.1.1.4 Viewing Distance

- Rounded value : 1.01 m (Precision value : 1.013793103 m)

2.1.1.5 Viewing Angle

- Typical viewing angle: CR \geq 10 : 1
 - Horizontal: $\pm 85^\circ$
 - Vertical: $\pm 85^\circ$

2.1.1.6 Screen Luminance (Brightness)

- >250 cd/m² (typical) on LCD screen on EMI glass pane surface

2.1.1.7 Contrast Ratio (at optimum viewing angle)

- 600 : 1 (typical) in dark environment

2.1.1.8 Response Time (at @ 25°C ambient temperature)

- Ton + Toff (10% to 90% to 10%) 12 ms (typical), 20 ms (maximal)

2.1.1.9 Color Temperature

- Typical 6790K

2.1.1.10 Luminance Uniformity

- White non-uniformity \leq 30%

2.1.1.11 Pixel Defects

- ISO 13406-2, Class 2

2.1.2 **DTC Description** (optical **D**rift and **T**olerance **C**ompensation system)

TFT flat panel monitor are used in a lot of different application like RADAR and ECDIS.

Different parameters like ambient temperature, manufacturing tolerances and aging have an influence on the colour presentation of a monitor.

These influences can decrease the colour presentation in an ECDIS in such a way that this monitor can't reach the **prescriptive** limits.

The innovative developed **D**rift and **T**olerance **C**ompensation function called **DTC**.

We measure different parameters like uptime, internal temperature, lamp status and brightness.

Based on this information the **DTC** function can minimize these influences and increase the colour presentation of the monitor.

All monitors of the Lambda 23 -xx (Typ BPM 723-DA-xx) series are equipped with the **DTC** feature.

Each monitor with the **DTC** function is factory calibrated to the backlight values of the ECDIS colour calibration / verification.

Each time when a backlight value is selected which is conform to a value of the colour table "DAY BRIGHT", "DUSK" or "NIGHT" the **DTC** function detects this automatically and starts to work.

Following example show the how it works:

- The calibrated valid backlight brightness value for the colour table "DAY BRIGHT" is 145. If the user set the backlight brightness value to 145 the **DTC** function detects this after 5 sec. and start to work.
- If the influences exceed the limit and the brightness of the backlight system is out of the tolerances the **DTC** function readjust the brightness of the backlight system to the calibrated value.
- If the user set the backlight value to 150, the DTC function stops to work. In this case the **DTC** is no more working and the influences are not compensated.

The adjustment of the backlight brightness value can be done on the front side push button or over the UCL command on the RS 232 interface.

The **DTC** function is working complete automatically and transparent and there is no action from the user needed.

2.2 Monitor Human Interface



Picture 2
Human Interface (actual OSD keypad colors)

2.2.1

OSD Keypad (On-Screen-Display)

- Push buttons: UP key
DOWN key
LEFT key (**factory locked**)
RIGHT key / MENU key (**factory locked**)
- Default function: UP & DOWN keys for direct **ECDIS** Backlight Brightness adjustment (“**BRILL**”). Simultaneous push on the LEFT & RIGHT keys sets the Backlight Brightness parameter to the last value, which was send from the **ECDIS** system over the RS-232 interface (“**DEFAULT**” / “▶■◀”).
- Sys. Administrator: Special keystroke combination for full OSD functionality (system administrator feature). Lock and unlock the LEFT & RIGHT OSD key functionality while pushing simultaneously during ~7 seconds the UP & DOWN keys while turning the Power ON.

2.2.2

OSD Features

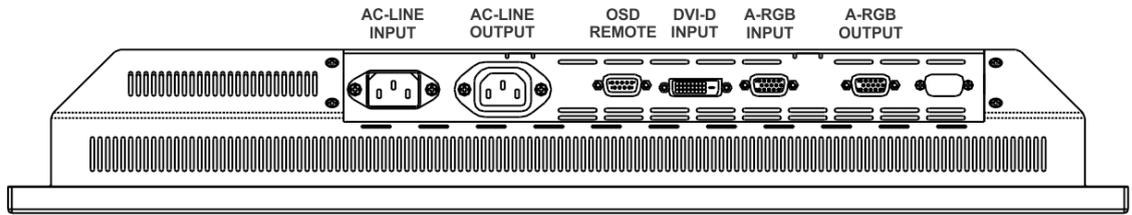
- User specific adjustments, like intensity, contrast, color, backlight brightness, input port selection, timing, zooming factor, etc.
- The setup parameters are saved in non-volatile memory

2.2.3

Power Switch / Power Indicator

- Power Push Button: Standby ON / OFF (for AC and DC versions)
- Power ON/OFF: Unit in normal operation mode: 0 seconds push to switch ON, >=2.5 seconds push to switch OFF
- ON/OFF Indicator: Green LED is "ON" if the unit is turned on
Green LED is "OFF" if the unit is turned off
The LED brightness is dimmed in two intensity steps under control of the Panel Backlight system.

2.3 Monitor Interface Connectors



Picture 3
Lambda 23 VF PM (N) connector's area

2.3.1 AC / DC Power Input

2.3.1.1.1 AC-Line Input Connector and AC-Line Filter

Pin	Supply
A	L
B	N
C	PE

- Connector: Standard IEC Inlet (male)

2.3.1.1.2 AC-Line Output Connector (Relay controlled output, max. 5A)

Pin	Supply
A	L
B	N
C	PE

- Connector: Standard IEC Outlet (female)

2.3.1.2 DC-Line Input Connector and DC-Line Filter

Pin	Supply	Pin	Supply
1 / 2	+ 18V to + 32V	3 / 4	Ground

- Connector: Binder 4-pin with screw lock (male)

2.3.2 OSD Remote Interface Connector

Pin	Signal	Pin	Signal	Pin	Signal
2	Transmit Data (TX)	3	Receive Data (RX)	5	Ground

- Connector: 9-socket D-SUB connector (female)
- On Screen Display (OSD) remote control
- Easy command language
- Firmware update channel
- RS-232 (V24) interface, X-On / X-Off handshake control

2.3.3 Analog RGB Input Connector

Pin	Signal	Pin	Signal	Pin	Signal
1	Red (RV)	6	Red Ground (RG)	11	-
2	Green (GV)	7	Green Ground (GG)	12	-
3	Blue (BV)	8	Blue Ground (BG)	13	HSync (HS)
4	-	9	-	14	VSynC (VS)
5	-	10	Logic Ground (LG)	15	-

- Connector: 15-socket HD-SUB connector (female)

2.3.3.1 Analog RGB Auto-scaling Functions

Input	Resolution	Vertical Sync.	Lambda 23 VF PM
VGA	640 x 480	@60Hz (50-200Hz)	Automatic "up-scaling" to 1600 x 1200 pixels
SVGA	800 x 600	@60Hz (50-150Hz)	Automatic "up-scaling" to 1600 x 1200 pixels
XGA	1024 x 768	@60Hz (50-100Hz)	Automatic "up-scaling" to 1600 x 1200 pixels
SXGA	1280 x 1024	@60Hz (50-85Hz)	Automatic "up-scaling" to 1600 x 1200 pixels
UXGA	1600 x 1200	@60Hz (50-60Hz)	Lambda 23 VF PM standard resolution

2.3.3.2 Analog RGB Signal Timings and Levels

- VESA Standard
- 162.5 MHz bandwidth, up to 100 kHz H-frequency, up to 200 Hz V- (UXGA 60 Hz)
- Auto-scaling to maximum flat panel resolution (VGA, SVGA, XGA and SXGA "up-scaling" to 1600 x 1200 pixels)
- 700 mVpp (75 ohm asymmetrical, end unit)

2.3.3.3 Analog RGB Data Cable

To ensure an optimum image quality, it is indispensable to use a high-end five wires coaxial cable with 75 Ω Impedance. We cannot take responsibility about the quality of the Vendor graphics controller card.

2.3.3.4

Analog RGB Synchronization

- Picture position, phase and size recognition with automatic self-adjustment capabilities (auto-phase / auto-tracking)
- Separate external horizontal synchronization (HS) and vertical synchronization (VS); both signals with positive or negative level
- External combined synchronization (CS), negative or positive synchronization
- Composite synchronization on green (SOG)

2.3.4

Analog RGB Output Connector

Pin	Signal	Pin	Signal	Pin	Signal
1	Red (RV)	6	Red Ground (RG)	11	-
2	Green (GV)	7	Green Ground (GG)	12	-
3	Blue (BV)	8	Blue Ground (BG)	13	HSync (HS)
4	-	9	-	14	VSync (VS)
5	-	10	Logic Ground (LG)	15	-

- Connector: 15-socket HD-SUB connector (female)

2.3.5

DVI-D Input Connector

Pin	Signal	Pin	Signal	Pin	Signal
1	RxD2-	11	Ground	21	-
2	RxD2+	12	-	22	Ground
3	Ground	13	-	23	RxC+
4	-	14	+5V Power	24	RxC-
5	-	15	Ground	25	Shield
6	DDC Clock	16	Hot Plug	26	Shield
7	DDC Data	17	RxD0-	C1	-
8	-	18	RxD0+	C2	-
9	RxD1-	19	Ground	C3	-
10	RxD1+	20	-	C4	-

- Connector: 24-socket MOLEX connector (female)

2.3.6

Buzzer Interface Connector (Option)

Pin	Signal	Pin	Signal
1	Buzzer +	9	Buzzer -

- Connector: 9-socket D-SUB connector (female)
- Operating voltage: 0.7 V (minimum) to 15 V (maximum)
- Operating current: 0.2 mA (at 0.7 V) to 13.4 mA (at 15 V)
- Signal frequency: 3500 Hz
- Sound pressure: 98 dB(A)*

* **Note:** All measurements are made at 1 meter, at 12 V, in free air at 21°C.

2.4 Power Supply

- 2.4.1 **DC-Supply** Lambda 23 VF PM (N) (Typ: BPM 723-DA/-RDA-DC24)
- Operating Value: 24 VDC
 - Maximum Range: 18 VDC to 32 VDC

- 2.4.2 **AC-Supply** Lambda 23 VF PM (N) (Typ: BPM 723-DA/-RDA-AC)
- Operating Values: 115 VAC / 230 VAC, @50/60 Hz
 - Maximum Range: 85 VAC to 264 VAC, @50/60 Hz

2.4.3 **Power Consumption**

	POWER (nominal)
DC-Supply (operation) at 24VDC	87 W
DC-Supply (standby) at 24VDC	3 W
AC-Supply (operation)	86 VA
AC-Supply (standby)	3.5 VA

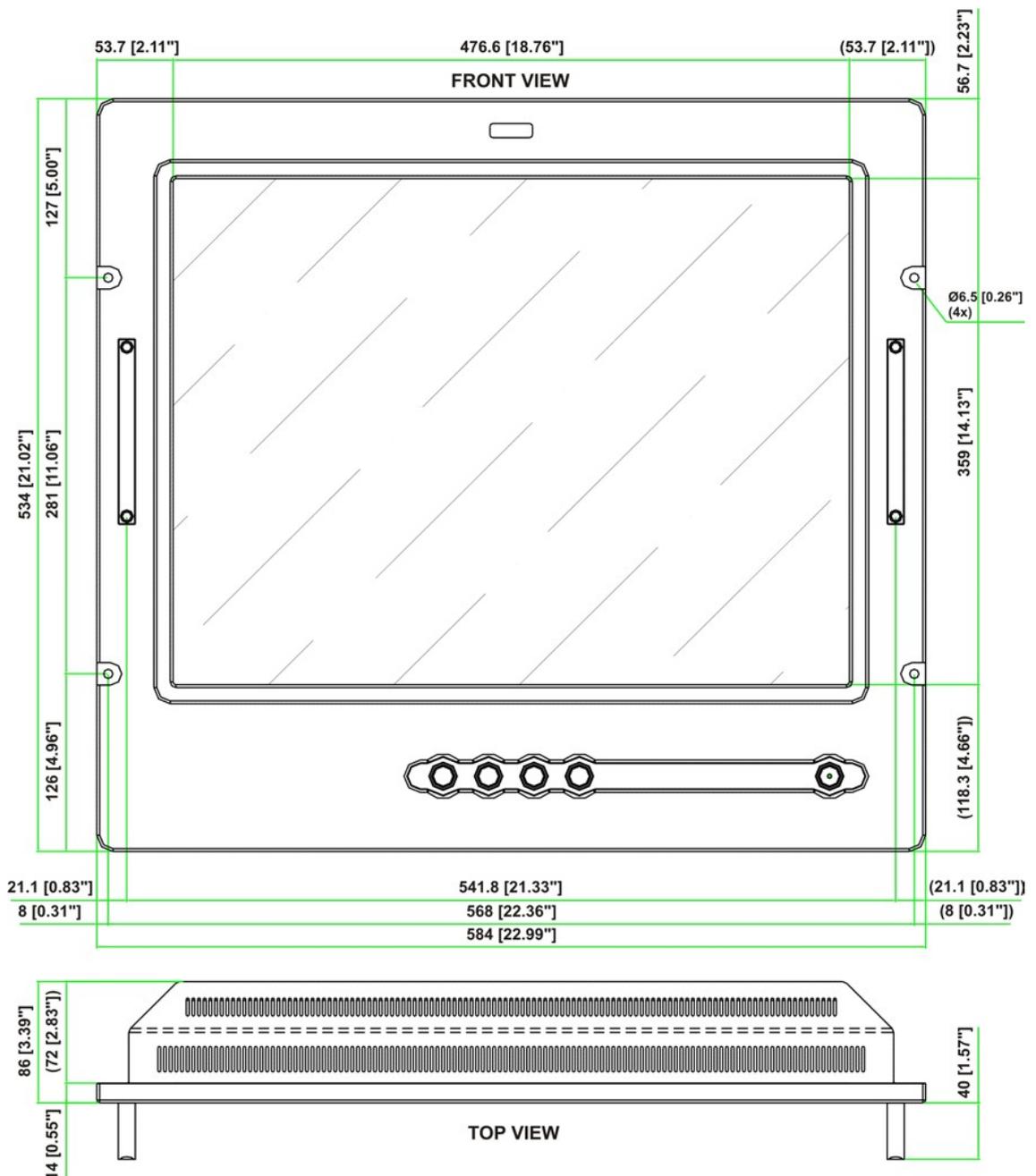
- 2.4.4 **Power Variation Protection**
- The unit will not damaged when Voltage transients remain within values as defined in the applicable standards.
 - The unit will not damaged when power with reverse polarity are applied.

2.5 Mechanical Specifications

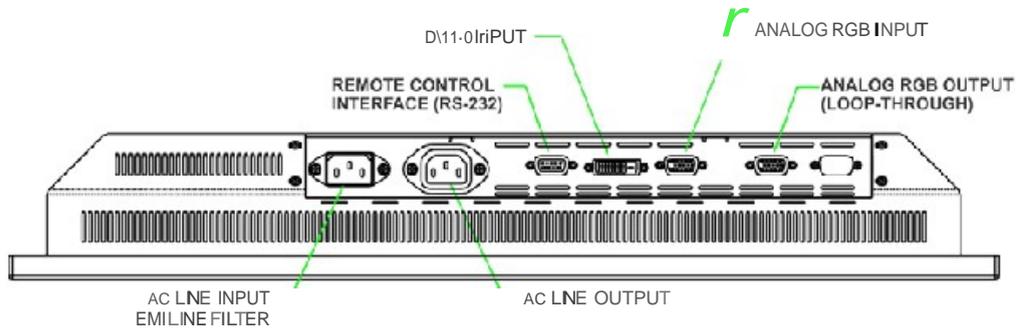
2.5.1 Installation

- Landscape 4 : 3 relation
- Standard console mounting compatible
- Console fixing: 4x M6 screw bolts
- Maximum mounting angle from the perpendicular: $\pm 35^\circ$, flatter mounting angles requires additional external cooling (customer responsibility)

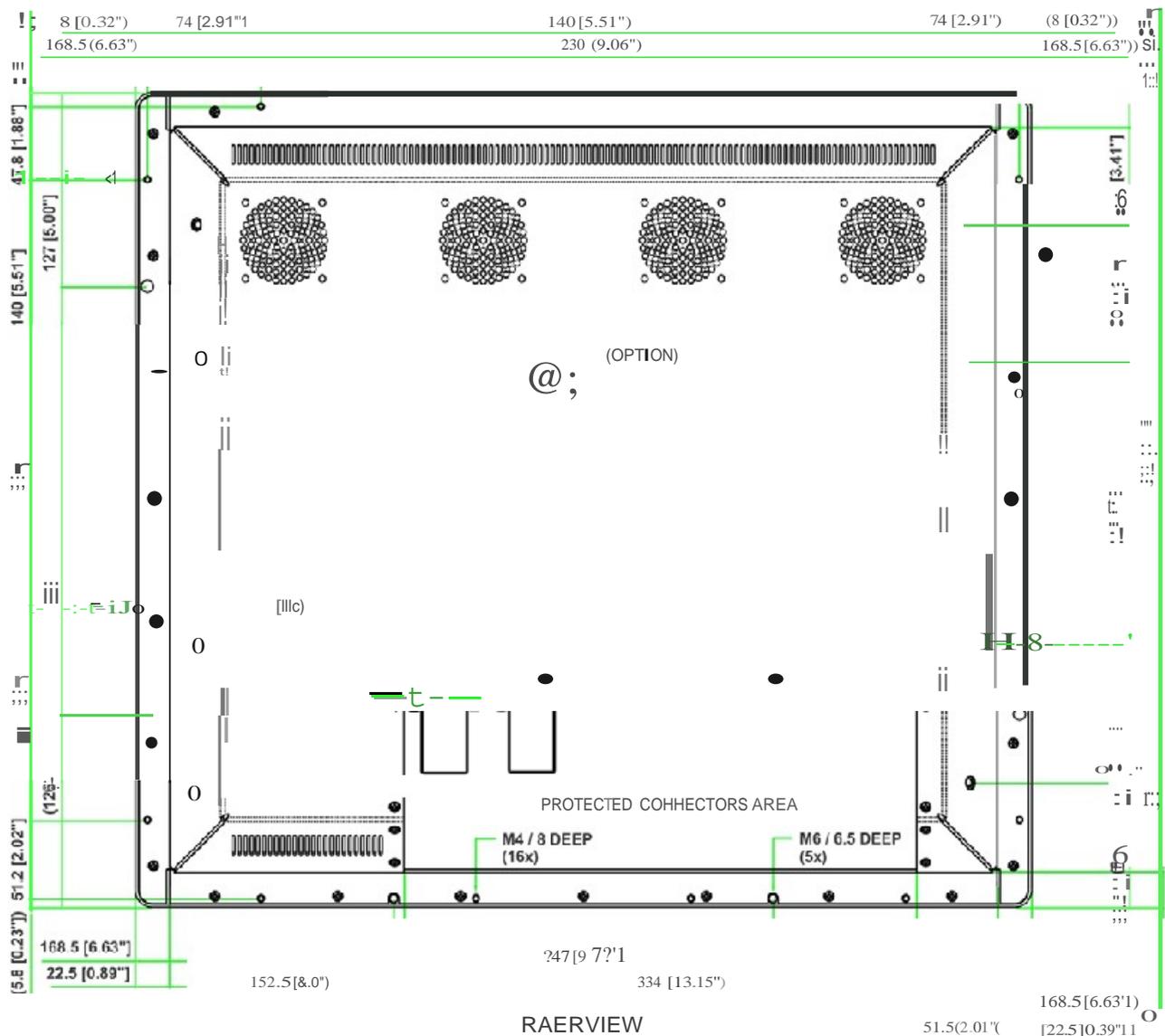
2.5.2 Dimensions (in mm / [inch])



Dimensions (continue)



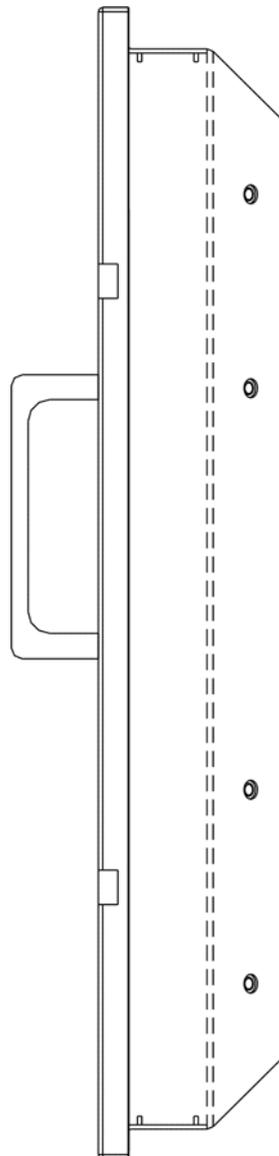
BOTTOMVIEW



RAERVIEW



Dimensions (continue)



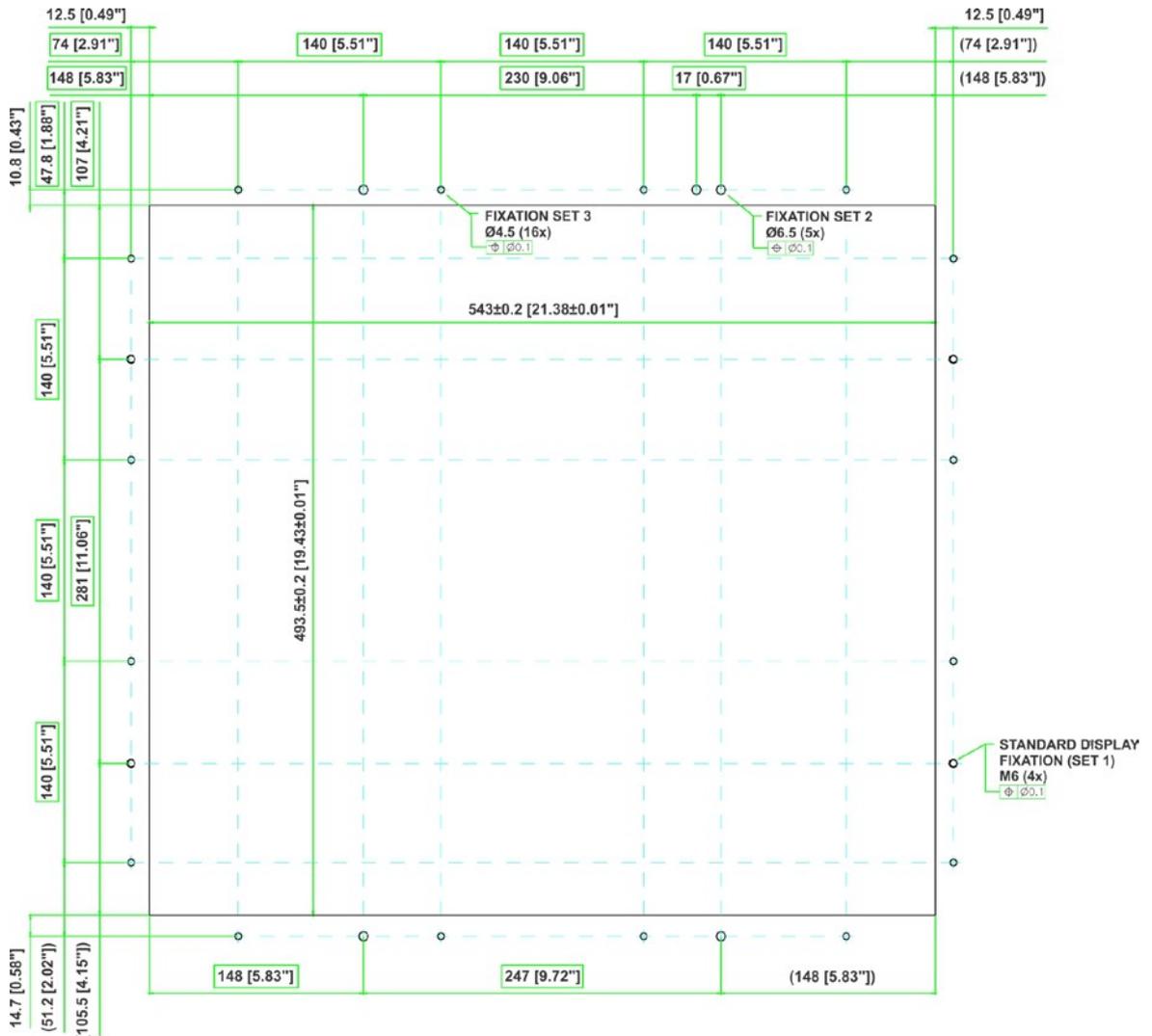
LEFT SIDE VIEW

	mm	Inch
Width	584	23
Height	534	21
Depth (without handles)	86	3.4
Depth (with handles)	126	4.96
Depth behind bezel	72	2.83
Console aperture	543 (W) x 505 (H)	21.37 x 19.88

2.5.3 **Housing Characteristics**

- From the full milled aluminum front bezel, aluminum chassis
- Additional fixing points (8x M6 thread holes)
- Protected connectors area

2.5.4 **Mounting Aperture**



Mounting Aperture

2.5.5 **Weight**

	Kg	lbs
DC Version	~ 12.5	~ 27.5
AC Version	~ 12.5	~ 27.5

2.6 Finishing

2.6.1 Standard Finishing

- Standard front bezel color: RAL 9005, black, with structure
- Lacquer type: 2-component acrylate polyurethane paint
- All aluminum parts: transparent chromate treated (RoHs conformity)
- Milled aluminum housing: AlMg 4,5 MN, salt water resistant

2.6.2 Optional Finishing

- Optional front bezel color: on customer base

2.7 Screws and Bolts

- Type of screws: maximum two standard tools
- Bolt type: M6 bezel bolts

2.8 Use of Toxic Materials

- Cadmium and asbestos are not used in the display unit

2.9 Used Components

- Industrial components with controlled extended temperature range are used in the unit

2.10 Packing

- The packing is according to the standards of international sea, air and ground transport rules.

2.11 Environmental Specifications

- ECDIS (Typ: BPM 723-DA)
 - Applying Test Standard IEC 61174 (Edition 2, 2001)
- RADAR (Typ: BPM 723-DA and BPM 723-RDA)
 - Applying Test Standard IEC 62288
 - Applying Test Standard IEC 62388
- MARITIME NAVIGATION AND RADIOCOMUNICATION EQUIPMENT AND SYSTEMS (Typ: BPM 723-DA and BPM 723-RDA)
 - Applying Test Standard IEC/EN 60945 (Edition 4, 2002)

- 2.11.1 RFI (IEC/EN 60945:2002-8)
- Clause 9.2 Conducted Emissions 10 kHz – 30 MHz
 - Clause 9.3 Radiated Emissions 150 kHz – 2 GHz
 - Clause 10.3 Conducted RF Disturbance (according IEC 61000-4-6:1996)
 - Clause 10.4 Radiated RF Disturbance (according IEC 61000-4-3:1995)
 - Clause 10.5 Electrical Fast Transients, burst (according IEC 61000-4-4:1995)
 - Clause 10.6 Slow Transients, surges (according IEC 61000-4-5:1995)
 - Clause 10.7 Power Short Term Variation (according IEC 61000-4-11:1994)
 - Clause 10.8 Power Supply Failure (according IEC 61000-4-11:1994)
 - Clause 10.9 Electrostatic Discharge (according IEC 61000-4-2:1995)
 - Compliance (designed to meet):
 - EN 55011 Class A
 - EN 50081-1
 - EN 50082-1
- 2.11.2 Vibration (IEC/EN 60945:2002-8)
- Resonance search
 - Frequency range: 5 Hz - 100 Hz
 - Amplitude: 5 Hz - 13.2 Hz; 1 mm
13.2 Hz - 100 Hz; 7 m/s² [0.7 g] (constant)
 - Sweep rate: 0.5 Oct./min
 - Test duration: 1 sweep / axis, in 3 axes
 - Resonance dwell (x – axis)
 - Frequency range: 70 Hz - 100 Hz
 - Amplitude: 0,7 g (constant)
 - Test duration: 2 h / x - axis
 - Resonance dwell (y – axis)
 - Frequency range: 30 Hz
 - Amplitude: 0,7 g (constant)
 - Test duration: 2 h / y - axis
 - Resonance dwell (z – axis)
 - Frequency range: 90 Hz - 100 Hz
 - Amplitude: 0,7 g (constant)
 - Test duration: 2 h / z - axis
- 2.11.3 Shock
- Designed to meet
 - Acceleration (non-operating): 30 G
 - Wave: Half-sine
 - Active Time: 15 ms
 - Direction: ±X, ±Y, ±Z (one time for each Axis)

- 2.11.4 Temperature (IEC/EN 60945:2002-8 “Protected from the weather”)
- Clause 8.2.2.2 Dry Heat
 - Clause 8.3.1.2 Damp Heat
 - Clause 8.4.2.4 Low Temperature
 - Operating: -15° C to 55° C
 - Storage: -25° C to 70° C
- 2.11.5 RH, Relative Humidity (IEC/EN 60945:2002-8 “Protected from the weather”)
- Operating: 5% to 95% RH (40° C, non-condensing)
 - Storage: 5% to 95% RH (40° C wet bulb temperature)
- 2.11.6 Altitude
- Designed to meet
 - Operating: 12,000 feet (3,600 meter)
 - Storage: 30,000 feet (10,000 meter)
- 2.11.7 Compass Distance
- Save Distance to:
 - Standard Magnetic Compass: 2.15 meter
 - Steering Magnetic Compass: 1.35 meter
 - Reduced Save Distance to:
 - Standard Magnetic Compass: 1.30 meter
 - Steering Magnetic Compass: 0.85 meter
- 2.11.8 Direct Sunshine Exposition
- Do not expose the LCD panel to direct sunlight.
 - Lightproof shade etc. should be attached when LCD panel is used under such environment.
 - If a light strong against a LCD panel is irradiated, it may lead to degradation of the panel characteristic and display grace may get worse.
 - Lambda electronic is not responsible for any damages involving direct sunshine exposition.
- 2.11.9 Image Persistence Problem (afterimage)
- Image persistence is caused by the continuous display of static graphics on the screen for extended periods of time. This problem is most common for elements of the display that do not change.
 - Lambda electronic is not responsible for any afterimage damages.

2.12 Other Specifications

2.12.1 MTBF

(Backlight and LCD panel are not included in the calculation)

2.12.1.1 Ground Fixed (GF) @ + 25°C

- MTBF calculated value: 65 000 hours (target)

2.12.1.2 Naval Sheltered (NS) @ + 40°C

- MTBF calculated value: 25 000 hours (target)

2.12.2 Maintenance

- 2.12.2.1 MTTR (Lambda 23 VF PM (N) Display has defined as a Line Replaceable Unit)
 - MTTR < 15 minutes

- 2.12.2.2 Use of Maintenance Equipment
 - Reduced to a strict minimum
 - No special equipment needed

- 2.12.2.3 Backlight Replacement
 - The LED backlight can be replaced at Lambda electronic

- 2.12.3 **Safety**
 - Units meets IEC 950, CE

- 2.12.4 **Wear-Out Items**
 - The backlight lifetime is 40 000 hours / lamp @ + 25°C
 - The backlight is considered failed at 50% of the initial light output
 - Lifetime is depending on the brightness setting during operation

2.13 Monitor Software Revision

- Baytek 1.00.06 (xxxx)

2.14 Trouble Shooting

Situation	Solution
Power LED dark	Check power cord Check main power switch (housing rear side)
Power LED "ON" Display Message "no signal"	Check signal cable Check "Signal source" selection in OSD
Displayed picture not centered	Check OSD "Position / Autoadjust"
Displayed image is not in right size / shape	Check OSD "Position / 1:1 View" and "Aspect Ratio"

3. OSD (ON-SCREEN-DISPLAY)

Main Menu

- Signal source ▶
- Position ▶
- Settings ▶
- Options ▶
- Quickmenu ▶
- Input Info ▶
- Service ▶
- Manufacturer ▶

AutoScan
 RGB
 DVI

Position

Autoadjust

Tracking - 2160 +

Phase - 33 +

Position (x) - 492 +

Position (y) - 48 +

Zoom - 0 +

H-Mirroring

V-Mirroring

Freeze

1:1 View

Aspect Ratio

Settings

Brightness - 0 +

Contrast - 0 +

separate RGB

Red contrast - 0 +

Green contrast - 0 +

Blue contrast - 0 +

LCD Backlight Brightness - 255 +

Default values

RGB Adjust

Options

Language ▶ English
 German

Buttons ▶

Save settings ▶

Options

Language ▶

Buttons ▶ Hotkeys
 Quickmenu

Save settings ▶

Options

Language ▶

Buttons ▶

Save settings ▶ **Data saved!**

Hotkeys

Save to hotkey <UP>

Save to hotkey <LEFT>

Save to hotkey <DOWN>

Quickmenu

Brightness

Contrast

Color Saturation

LCD Backlight Brightness

LCD Backlight On/Off

Source

Input Info

Pixel frequency 162 MHz

Horizontal frequency 74.9 KHz

Vertical frequency 59.9 Hz

Interlaced 0

HSync polarity 1

VSyn polarity 1

Sync on green 0

Composite Sync 0

Service

Product code AVD5

Software Revision 1 . xx . xx (xxxx)

Serial No. 0000 BT 0000789

Temperature internal 33 C

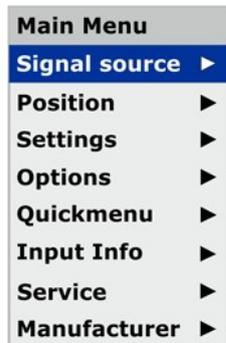
Operating time 0 d 0 h

Manufacturer

 **BAYTEK**
 Breslauer Strasse 2a
 D-85386 Eching
<http://www.baytek.de>

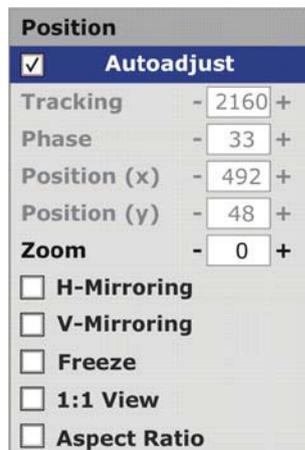
3.1 OSD Setup

3.1.1 Main Menu



Select the Main Menu by pressing the OSD-keypad button **[RIGHT]**. Select the desired submenu using the **[DOWN]** or **[UP]** buttons. Close the Main Menu by pressing the button **[LEFT]**. Select any submenu item by pressing the **[RIGHT]** button.

3.1.2 Position Menu



The Position Menu allows picture related adjustments, like manual picture "X" and "Y" positioning (if "Auto center" is set "OFF"), picture mirroring or rotation, etc. Select the menu items by pressing the **[UP]** or **[DOWN]** buttons, uses the **[RIGHT]** and **[LEFT]** buttons to modify the numerical values of the items. Quit the parameter changes using the **[UP]** or **[DOWN]** buttons, close the Input Menu Window by pressing the **[LEFT]** button.

We recommend setting the "Autoadjust" function to „active“. The manual adjustment of the "Tracking" and "Phase" parameters is useful for special non-standard resolution or for test purposes. We recommend also putting the "Autocenter" in the active mode; in this case, the picture is automatically centered on the flat panel screen without any operator intervention.

3.1.2.1 Autoadjust

Switch to enable or disable auto-tracking and auto-phase capabilities. If enabled, the logic decodes from the input signals automatically the best picture tracking and phase parameters. Disable this function if you want to make the adjustments manually.

3.1.2.2 Tracking - Manual adjustment if "Autoadjust" disabled -

Increase or decrease the numerical value until find the right tracking point. Use the [RIGHT] and [LEFT] OSD-keypad buttons for adjustment.

3.1.2.3 Phase - Manual adjustment if "Autoadjust" disabled -

Increase or decrease the numerical value until find the right phase point. Use the [RIGHT] and [LEFT] OSD-keypad buttons for adjustment.

3.1.2.4 Horizontal Position (X)  - Manual adjustment if "Autocenter" disabled -

Move the picture in horizontal left or right direction by modifying the numerical value in this field. (OSD-keypad buttons [RIGHT] and [LEFT])
Increase or decrease the numerical value until the active area of the screen is exactly filled.
Higher or lower resolutions are automatically sampled (scaled) to the native flat panel resolution (1600 x 1200 pixels).

3.1.2.5 Vertical Position (Y)  - Manual adjustment if "Autocenter" disabled -

Move the picture in vertical up or down direction by modifying the numerical value in this field. (OSD-keypad buttons [RIGHT] and [LEFT])
Increase or decrease the numerical value until the active area of the screen is exactly filled.
Higher or lower resolutions are automatically sampled (scaled) to the native flat panel resolution (1600 x 1200 pixels).

3.1.2.6 Zoom

This function zoom the picture in accordance to the specified numerical value. The picture is zoomed out starting from the center of the screen; an adjustable zoom window is not available. Please use the OSD-keypad buttons [RIGHT] and [LEFT]) to modify the zoom factor.

3.1.2.7 Horizontal Mirroring

This function allows a horizontal mirroring of the screen contents. (OSD-keypad buttons [RIGHT] and [LEFT])
For a 180° picture rotation, please set the vertical and horizontal mirroring functions to "ON".

3.1.2.8 **Vertical Mirroring**

This function allows a vertical mirroring of the screen contents. (OSD-keypad buttons [RIGHT] and [LEFT]).
For a 180° picture rotation, please set the vertical and horizontal mirroring functions to "ON".

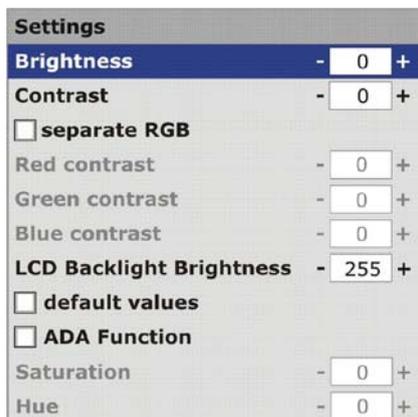
3.1.2.9 **1:1 Mode**

Set to enable, if you like to display the original analog RGB input signal source resolution on the screen. This switch enables or disables the auto-scaling logic on the converter board. A lower resolution input signal as the native panel resolution, will be displayed 1:1 centered on the screen. This is not allowed if the input resolution is higher than the native TFT resolution.

3.1.2.10 **Aspect Ratio**

With this function, it is possible to keep the signal source aspect ratio on the screen. The Lambda 23 VF PM (N) Panel is specified with 1600 x 1200 pixels resolution (UXGA, 4:3 aspect ratio). If you connect a SXGA signal (1280 x 1024 pixels, 5:4 aspect ratio) to the monitor with disabled "aspect ratio" capability, the signal will be scaled automatically to UXGA resolution. If you enable this function, the SXGA input signal will be maintained in their 5:4 aspect ratio on the UXGA screen.

3.1.3 **Settings Menu**



With the Settings Menu, it is possible to adjust the flat panel display parameters.

3.1.3.1 **Brightness** ☀

The brightness adjustment increases or decreases the DC offset of the input signal. The black level of the signal are also increased or decreased (buttons [RIGHT] and [LEFT]). Adjust the brightness level to your own convenience.

3.1.3.2 Contrast ◀

The Contrast adjustment increase or decrease the RGB gain of the input signal. (OSD-keypad buttons [RIGHT] and [LEFT]).

3.1.3.3 RGB separate

The "RGB separate" function allows individual analog gain adjustments of the R, G and B signal inputs. If the function is set to "OFF", the RGB inputs are gained equally in accordance to the "Contrast" level.

3.1.3.4 Red contrast ● / Green contrast ● / Blue contrast ●

Die RGB contrast adjustments modifies the gain of each input individually. These analog adjustments are useful to make fine color appreciation corrections in combination with the digital "Gamma Value" function.

Please increase or decrease the numerical setting values using the OSD-keypad buttons [RIGHT] and [LEFT].

3.1.3.5 LCD Backlight Brightness

Adjust the Backlight Brightness level to your own convenience.
Use the [RIGHT] and [LEFT] buttons to increase or decrease the value.

Info: *The "LCD Backlight Brightness" menu item value regulates the intensity of the cathode tubes (flat panel backlight unit). Changing the numerical value, more or less light will shine through the LCD cells and the picture will be appears lighter or darker. Take care about this adjustment! If the value is to low, the panel appears dark and you can have the impression of a malfunction of your monitor. **Panel active, but not enough backlight brightness!***

3.1.3.6 Default values

This switch reset the modified Brightness and Contrast values back to default.

3.1.3.7 RGB Adjust

This switch is for display adjustment purposes only.

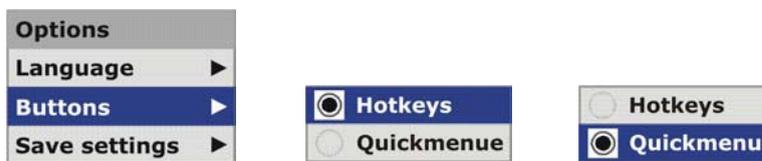
3.1.4 Options Menu

3.1.4.1 Language

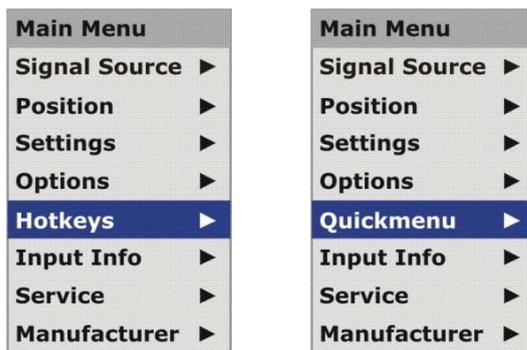


Menu language choice: German and English. Use the [UP] and [DOWN] buttons.

3.1.4.2 Hotkeys or Quickmenu Function Selection



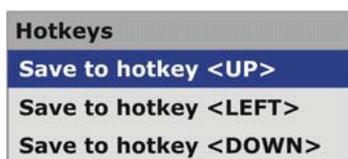
First, it is necessary to assign the [UP], [DOWN] and [LEFT] OSD buttons to the "Hotkeys" or to the "Quickmenu" functionality.



3.1.4.3 Save Settings

All menu adjustments can be saved in the non-volatile RAM while pressing the [RIGHT] button.

3.1.5 Hotkeys Menu



With this function, it is possible to save some setting parameters to the OSD-keypad buttons "UP", "DOWN" and "LEFT". With the Hotkeys, it is very simple to switch to the predefined settings without OSD-Menu intervention. The following setup parameters can be assigned to the Hotkeys:

General Parameters	General Parameters (continue)
Signal Source	LCD Backlight Brightness
1:1-Mode	
H-Mirroring (*)	
V-Mirroring (*)	Analog RGB Parameters
Brightness (signal)	Red contrast
Contrast (signal)	Green contrast
	Blue contrast

(*) If Autocenter = "0", it was also additionally restored the X an Y position

To save the settings to a hotkey, proceed as follow:

1. Make your picture settings (OSD-Menu).
2. Under the menu item "hotkeys", select one of the available keys and save it.
3. To have this hotkey settings available after power ON/OFF sequences, it is necessary to save the actual OSD status while using „Save settings” under the "Option Menu".

3.1.6

Quickmenu



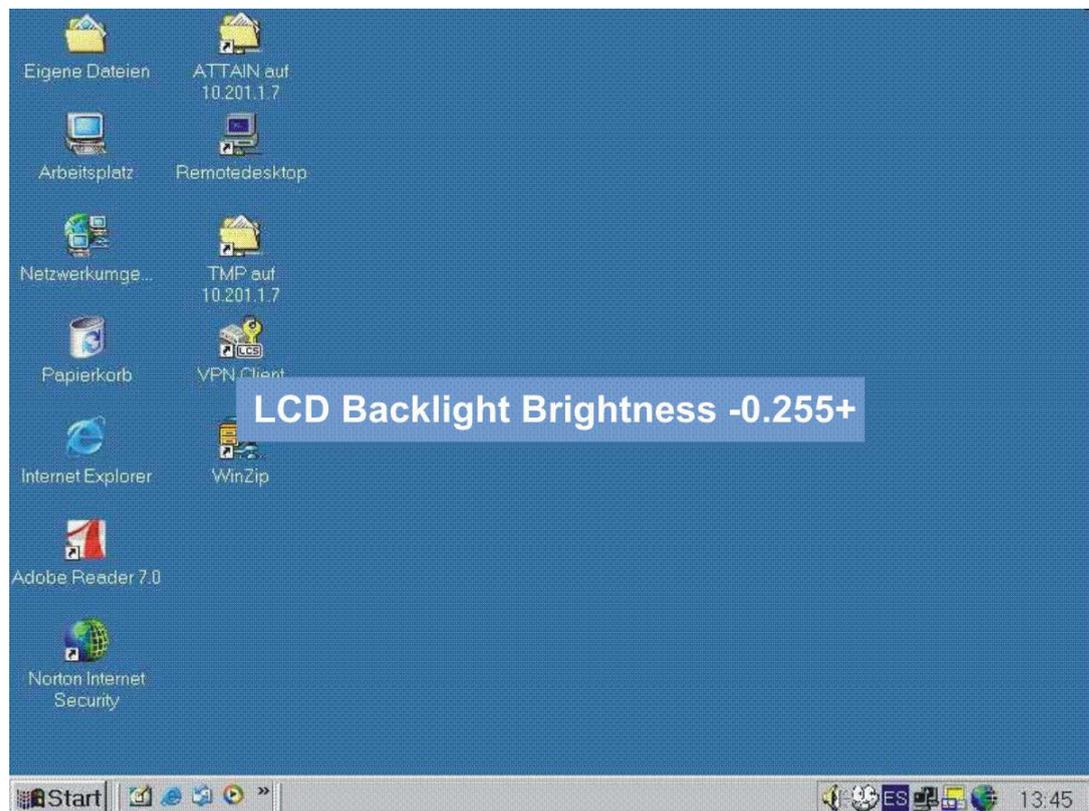
To get the "Quickmenu" instead of the "Hotkeys" functions, it is necessary to reassign the three push buttons selecting "**Options**" / "**Buttons**" -> "**Quickmenu**". After this action, the "**Options**" menu is closed automatically and the "**Main Menu**" shows instantly the "**Quickmenu**" selection item.



After the "Quickmenu" is selected, please define which ones of the quick functions will be activated. Following functions are available: Brightness, Contrast, LCD Backlight Brightness and LCD Backlight ON/OFF. Please close the OSD Menu entirely after your selection is done.

From now on, you can modify the parameter values of the activated quick menus as follow:

- Scroll using the [**LEFT**] key the "Quickmenu" and select the desired item. The actual selected item is shown centered, as an overlay window, on the panel screen.
- Modify the parameter values while using the [**UP**] and [**DOWN**] push buttons



Picture 3 (Quickmenu parameter)

It is also possible to modify the parameters of the last open item with closed menu, in this case use the [**UP**] and [**DOWN**] keys. If you like to see the menu item on the screen, simply push the [**LEFT**] key and then modify the parameter values while using the [**UP**] and [**DOWN**] keys.

The [**RIGHT**] key close spontaneously the Quickmenu on the screen before the time out (15 sec.) has runs off. The Autosave function secures the changed values in the Flash Memory after 5 to 10 sec. of the last parameter modification.

The [**UP**] / [**DOWN**] keys accelerator function does not work with closed OSD- or Quickmenu; it will take a little more time to increase or decrease the parameter values.

The selected / adjusted parameters are saved as valid in the flash memory if a valid signal (RGB, video) is present on the selected input port. If you switch to a non-active input port while using the Quickmenu capabilities, the performed changes will be accepted but not saved. It will be used the last active input port adjustments that has been modified with the Quickmenu.

If you switch "OFF" the LCD Backlight any further push on any key will be automatically switch "ON" the Backlight again. With this function are ensured, that the Backlight are always enabled before the user attempt to change the OSD keys functionality.

IMPORTANT NOTICE: To reset the Backlight Brightness to the last UCL value, it is necessary to push the [RIGHT] and [LEFT] OSD buttons at the same time. This action is only available if the Console is running in the UCL dialog mode and the [RIGHT] / [LEFT] keys are locked (not in the standard OSD menu mode).

3.1.7 Input Info

Input Info	
Pixel frequency	162 MHz
Horizontal frequency	74.9 KHz
Vertical frequency	59.9 Hz
Interlaced	0
HSync polarity	1
VSyc polarity	1
Sync on green	0
Composite Sync	0

The Input Info window shows the actual input signal characteristics. Each info parameter is very important for the right functionality of the monitor, for all in reference to the maximum vertical frequency rate.

3.1.8 Service Info

Service	
Product code	AVD5
Software Revision	1 . xx . xx (xxxx)
Serial No.	0000 BT 0000789
Temperature internal	33 C
Operating time	0 d 0 h

The Service Window shows the type of **BayView AD5** converter card in use. The information is useful for eventual Firmware updates (Software Revision) and for service requests (Serial No. and Product code).

3.1.9 Manufacturer Info



3.1.10 OSD Keypad



Picture 4 (OSD-Keypad)

4. REMOTE CONTROL

4.1 Universal Command Language (UCL) Description

[Based on AVD5 Firmware Version 1.00.06(xxxx)]

The BPM Monitor has a RS-232 Interface for Remote Control. After Power up, the RS232 Interface has the following configuration:

Protocol: UCL
 Baud rate: 9600
 Data bits: 8
 Stop bit: 1
 Parity: No
 Handshake: No
 Monitor ID: 255 (0xFF)

Message Format

Byte #	0	1	2, 3, 4	5	6	7, etc.	7+LEN
	ATTN	ADDR	CMD	LEN	IHCHK	DATA	IDCHK

Minimal message size: 7 bytes
 Maximal message size: 82 bytes

Byte 0 = Attention (ATTN)

This byte is used to declare the message type.

Possible values:

ATTN	Description
0x07	Command (ASCII Bell)
0x06	Acknowledge (ASCII ACK)
0x15	Negative Acknowledge (ASCII NACK)

A device shall send a command using the 0x07 Attention Code. The monitor will respond to the command with an ACK if the command completed successfully.

Byte 1 = Address (ADDR)

This byte is used to specify a particular monitor to receive a Command and to identify the monitor responding (ACK or NACK) to a Command.

Possible values:

ADDR	Description
0xFF	Only allowed value under RS232 Interface

Bytes 2, 3, and 4 = Command (CMD)

The command shall be selected using one of the following values:

ASCII	CMD 0	CMD 1	CMD 2	Description
"ADA"	0x41	0x44	0x41	Monitor ADA Adjust
"BRT"	0x42	0x52	0x54	Backlight Brightness
"IST"	0x49	0x53	0x54	Monitor In-Service Test
"MAN"	0x4D	0x41	0x4E	Manufacturer ID
"MCC"	0x4D	0x43	0x43	Monitor control command
"POV"	0x50	0x4F	0x56	Power On State Information
"TVC"	0x54	0x56	0x43	Temperature Value Information
"UTM"	0x55	0x54	0x4D	Monitor Uptime Information
"VER"	0x56	0x45	0x52	Monitor ID Model/Version Number

Byte 5 = Data Length (LEN)

This byte defines the length of DATA in the message in bytes.

Minimal length value: 0 bytes

Maximal length value: 74 bytes

Byte 6 = Inverse Header Checksum (IHCHK)

This is a simple 8-bit checksum of the header data (message bytes 0 to 5), on which a bit-wise inversion has been performed. Checksum shall be initialized to 0.

The 8-bit sum (without carry) of bytes 0, 1, 2, 3, 4, 5 and 6 shall be 0xFF.

Byte(s) 7 to maximum 74 = Data Field (DATA)

The DATA field shall only be transmitted if LEN is greater than 0.

This field is dependent upon the CMD transmitted.

Byte 7+LEN = Inverse Data Checksum (IDCHK)

This byte shall only be transmitted if the LEN is greater than 0.

This is a simple 8-bit checksum of the data field, message bytes 7 to 7+(LEN-1) on which a bit-wise inversion has been performed. The checksum shall be initialized to 0.

The 8-bit sum (without carry) of bytes 7 through 7+LEN inclusive shall be 0xFF.

If serial messages stop being transmitted or are corrupt, the monitor will remain at the last command.

All commands shall be transmitted to the monitor at a repetition no faster than 250ms. No commands shall be transmitted to the monitor during the monitor boot phase.

Following an individual addressed command, the next command shall not be issued until at least Tag = 5 periods after the ACK or NAK message received. At 9600, that is $5 \cdot 10 / 9600 = 5.2\text{ms}$.

When a monitor receives an incomplete message and the next byte is not received until after a time equal to the inter-message gap, the next bytes shall be processed to check for start of a new command (0x07).

If the header checksum is valid, but the first byte of the command message is not 0x07, as specified, the monitor may wait after the next inter-message gap to resume checking. A NACK message shall not be generated.

4.1.1 Description

4.1.1.1 Analog (RGB) / Digital Adjustment "ADA"

4.1.1.1.1 Introduction

In many applications, it is standard to interface the analog RGB Monitor over a 15-pin HD-DSUB connector. The input hardware of the TFT monitor converts, via high speed and high precision A/D converters, these analog video signals to digital information. To get the best picture quality it is necessary to setup the correct adaptation values between the graphic controller card and the monitor. The implemented ADA function helps the customer to make these adjustments very easy and efficient.

4.1.1.1.2 Application

Before you start with the adjustments be sure that the BPM Monitor is correctly connected to the graphics of your choice, that the system is up and running, and that the system components are on normal operation temperature. If you change any component of the system (graphics card, cable, cable length, monitor, etc.) it is necessary to calibrate the adjustments again.

ATTENTION: *It is not necessary to make input calibrations for digital interfaces, like DVI (!) In this case, it is not necessary to convert signals; the source is digital and the TFT panel too.*

4.1.1.1.3 Pre-requisites

To make proper adjustments it is necessary to use the appropriate Baytek test pictures. These pictures are available on our WEB Page (<http://www.baytek.de>) under "**software downloads / ADA Calibration Test Pictures**". The self-running .EXE or .BMP graphic files are available as:

* BTIMG-02_1 for UXGA	(1600 x 1200 pixels)
* BTIMG-02_2 for SXGA	(1280 x 1024 pixels)
* BTIMG-02_3 for XGA	(1024 x 768 pixels)
* BTIMG-02_4 for SVGA	(800 x 600 pixels)
* BTIMG-02_5 for VGA	(640 x 480 pixels)
* BTIMG-02_6 for WUXGA	(1920 x 1200 pixels)
* BTIMG-02_7 for WSXGA	(1680 x 1050 pixels)
* BTIMG-02_8 for HDTV / FHD	(1920 x 1080 pixels)

It is very important to set the graphics card to the native TFT panel resolution (no scaling mode). For a 1600 x 1200 pixels, TFT panel the graphics card must be set to UXGA (60 Hz) resolution. In this case, the Calibration Test Picture BTMG-02_1 must be used. To get the best calibration you must be display the test pictures in the original uncompressed format (BMP) and in 1:1 resolution.

Exceptions: If the monitor is used continuously in a scaled format, as an example a native UXGA TFT Panel working in SXGA resolution, it is necessary to make the calibration in the displayed mode (1280 x 1024 pixels in this case). Like above it is necessary to take the right test picture and to setup the graphics card properly for this operation resolution.

Comment: *It is not necessary to use high frame rates with TFT panels. CRT's needs high frame rates to compensate the phosphor shut up/down times (flickering effect). Use 50 to 60 Hz frame rates for our monitors, this will set down the interface frequency and will be an advantage in the overall display quality.*

4.1.1.1.4 **Calibration**

We take an UXGA installation as example to perform all adjustment steps (TFT Panel and graphics card works with 1600 x 1200 pixels resolution).

The BTIMG-02_1 for UXGA test picture covers the entire display surface. It is important to suppress any other visible icons, like the mouse pointer, etc., on the screen. Undesired screen icons will be affect directly the adjustment results or cause in some cases the malfunction of the program.

Now start "ADA" command in the OSD submenu settings. After start, the function the message "Measurement" will be displayed. The "Test Picture" will be shaking a little bit during this measurement phase. After approximately 20 seconds, the measurement is done and the message "OK" will be displayed. If you take, a wrong test picture for the calibration the error message "No Test Picture" will be showed.

The self-generated brightness and contrast values are displayed in the correspondent OSD items. If you like to save these values permanently you must be proceed to use the "Save settings" OSD function for this purpose.

The "ADA" function is available as offline OSD or as online Remote UCL command.

4.1.1.1.5 **ADA / UCL Handling and Errors**

The UCL does not accept other commands until the ADA-Command are progressed (approx. 20 seconds or more).

The ADA Function works only in RGB input mode (use MCC command or OSD to choose the RGB input). If no answer is, send in a timeout time the command failed.

Example:

Request ADA Function:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK
0x07	0xFF	0x41	0x44	0x41	0x00	0x33

Acknowledge the color adjust is finished 0x01

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x41	0x44	0x41	0x01	0x33	0x01	0xFE

The BPM Monitor answers to this command with an ACK attention code. The DATA field contains data values, informs if the adjust succeeded (0x01) or failed (0x02). The reasons for a fail are:

1. Not open "Baytek Monitor Test" Picture,
2. The main channel input is not RGB, or
3. A wrong resolution was chosen.

4.1.1.2 **Backlight Brightness Instruction "BRT"**

This command contains the backlight brightness control setting. The brightness value shall be sent as a 1 byte in the data field. A data value of 0x00 indicates minimum backlight brightness.

A data value of 0xFF indicates maximum backlight brightness. Note: Intermediate values between 0x00 and 0xFF will control the brightness over the range from minimum to maximum backlight brightness. This adjustment characteristic will be the same as in the On Screen Display (OSD value 0d – 255d).

If no answer is, send in a timeout time the command failed.

Example:

Adjust up to 60% Backlight Brightness (actual Value is 40%):

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x42	0x52	0x54	0x01	0x10	0x99	0x66

Acknowledge 60% Brightness:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x42	0x52	0x54	0x01	0x11	0x99	0x66

4.1.1.3 **Monitor In-Service Test "IST"**

This command must be sent to the monitor, if you want to test operational state of internal devices inside the BPM monitor. Each test has a number, which is sent as a 1 byte in the data field. The BPM Monitor answers to this command with an ACK attention code. The UCL accepts no more commands until the Command were progressed (Approx. 1 seconds or more).

The DATA field contains data value, which is the operational state of device. If no answer is, send in a timeout time the command failed.

Test Numbers:

- 0x00: Test the state of Backlight tubes, when supported.
 - ACK: 0x3F all 6 backlight tubes are in service
 - ... Bitwise state of the tubes
 - 1: tube ok
 - 0: tube is out of order
 - 0x00 all 6 backlight tubes are out of order
 - 0xFF the feature is not supported by this monitor

Example:

Request a Backlight Tube Test:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	IDCHK
0x07	0xFF	0x49	0x53	0x54	0x01	0x08	0x00	0xFF

Acknowledge Backlight Tube 0 and 5 out of order (0x1E bitwise 011110):

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	IDCHK
0x06	0xFF	0x49	0x53	0x54	0x01	0x09	0x1E	0xE1

4.1.1.4 **Manufacturer ID "MAN"**

This command must be sent to the monitor, to read the Manufacturer ID. This is only a request command, and no data must be sent to the monitor. The BPM Monitor answers to this command with an ACK attention code. The DATA field contains an ASCII string value that is a unique manufacturer data code. If no answer is, send in a timeout time the command failed.

Example:

Request command Manufacturer ID code:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK
0x07	0xFF	0x4D	0x41	0x4E	0x00	0x1D

Acknowledge Manufacturer ID code "BAYTEK"

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"B"	"A"	"Y"	"T"	"E"
0x06	0xFF	0x4D	0x41	0x4E	0x06	0x18	0x42	0x41	0x59	0x54	0x45
"K"	IDCHK										
0x4B	0x3F										

4.1.1.5 **Monitor Control Command "MCC"**

This command is used for communication with the video interface controller of the monitor. This command allows remote control of the monitor's setup parameters. The video controller commands are transmitted in the data field. See Appendix for complete list of control commands. Please note that not all video controllers support this feature and Baytek cannot guarantee that all commands are available.

If the sent command is valid, the monitor reply to this command with an ACK attention code, whereby the data field contains the original command followed by acknowledge from the controller. The Acknowledge will only be send, if the address byte is broadcasted (0xFF). If no answer is, send in a timeout time the command failed.

In following cases, the UCL command interpreter goes into IDLE state, and waits for new commands:

- Command is not supported by the firmware
- Own Monitor Address ID is wrong, or
- IHCHK or IDCHK is wrong

Example: Command 50% "Set all Contrast="; (0x82 0x41 0x38 0x30)

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CON"	"A"	"8"	"0"	IDCHK
0x07	0xFF	0x4D	0x43	0x43	0x04	0x22	0x82	0x41	0x38	0x30	0x4D

Acknowledge 50% Contrast:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CON"	"A"	"8"	"0"
0x06	0xFF	0x4D	0x43	0x43	0x06	0x21	0x82	0x41	0x38	0x30

"8"	"0"	IDCHK
0x38	0x30	0x6C
NEW VALUE		

Additional Information to the “MCC-Color Table Handling”:

In order to do a CIE color calibration procedure to confirm that the color specified in the IHO Presentation library is correctly displayed, you need to transform the color space from CIE to RGB. This color meets the requirements only at a fixed backlight value. With the Color Table Handling command, you can query or set the RGB values and the backlight value.

Example for query:

IHO Presentation library entry: NODTA at DAY Time Period:

CIE color space: x=0,28 y=0,31 Lv=40 cd/m²

RGB color space: R= 148(94_{hex}) G= 172(AC_{hex}) B= 180(B4_{hex})

Command: “DAY,NODTA”= (0x70, 0x3F,0x44, 0x41, 0x59, 0x4E, 0x4F, 0x44, 0x54, 0x41)

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CTAB"	"?"	"D"	"A"	"Y"
0x07	0xFF	0x4D	0x43	0x43	0x0A	0x1C	0x70	0x3F	0x44	0x41	0x59
"N"	"O"	"D"	"T"	"A"	IDCHK						
0x4E	0x4F	0x44	0x54	0x41	0xFC						

Acknowledge: R=148(94_{hex}) G=172(AC_{hex}) B=180(B4_{hex}):

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CTAB"	"?"	"D"	"A"	"Y"
0x06	0xFF	0x4D	0x43	0x43	0x10	0x17	0x70	0x3F	0x44	0x41	0x59
"N"	"O"	"D"	"T"	"A"	R="9"	R="4"	G="A"	G="C"	B="B"	B="4"	IDCHK
0x4E	0x4F	0x44	0x54	0x41	0x39	0x34	0x41	0x43	0x42	0x34	0x59

R

G

B

Additional Information to the “MCC-Customer Key Handling”:

Example for setting:

Command: Key=0xAB13

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CKEY"	"A"	"B"	"1"	"3"
0x07	0xFF	0x4D	0x43	0x43	0x05	0x21	0x71	0x41	0x42	0x31	0x30
IDCHK											
0xA7											

Acknowledge:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CKEY"	"A"	"B"	"1"	"3"
0x06	0xFF	0x4D	0x43	0x43	0x09	0x1E	0x71	0x41	0x42	0x31	0x33
"A"	"B"	"1"	"3"	IDCHK							
0x41	0x42	0x31	0x33	0xC0							

Note: When the value is no hex-Value the Monitor returns a negative Acknowledge, which contains the sent data. If set lowercase values it is converted to uppercase inside the UCL-interpreter.

Negative Acknowledge: Key=NOTX

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CKEY"	"N"	"O"	"T"	"X"
0x15	0xFF	0x4D	0x43	0x43	0x05	0x13	0x71	0x4E	0x4F	0x54	0x58
IDCHK											
0x45											

Note: The Query-Acknowledge starts with the "ADDR"-Tag and not with the "ATTN"-Tag 0x06.

ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	"CKEY"	"A"	"B"	"1"	"3"	IDCHK
0xFF	0x4D	0x43	0x43	0x06	0x27	0x71	0x41	0x42	0x31	0x33	0x68

Appendix Command Table:

Function	Command	Description	Range	Acknowledge
Brightness Control	0x81, nn "+" " -" "r" "R" "?"	Set brightness= Value increment / decrement Reset Query	64 = mean value 0 = min. value 127 = max. value	Brightness
Contrast Control All channels	0x82,"a" "A", nn "+" " -" "r" "R" "?"	Set all contrast= Value increment / decrement Reset Query	128 = mean value 0 = min. value 255 = max. value	All Contrast
Contrast Control Red channel	0x82,"r" "R", nn "+" " -" "r" "R" "?"	Set all contrast= Value increment / decrement Reset Query	128 = mean value 0 = min. value 255 = max. value	Contrast red
Contrast Control Green channel	0x82,"g" "G", nn "+" " -" "r" "R" "?"	Set all contrast= Value increment / decrement Reset Query	128 = mean value 0 = min. value 255 = max. value	Contrast green
Contrast Control Blue channel	0x82,"b" "B", nn "+" " -" "r" "R" "?"	Set all contrast= Value increment / decrement Reset Query	128 = mean value 0 = min. value 255 = max. value	Contrast blue
Scaling Mode	0x8c,"0" "1" 2 "r" "R" "?"	Set graphic image scaling mode= Value Reset Query	"0" = full screen "1" = 1:1 screen "2" = aspect ratio	Scaling Mode
Input Main Select	0x98,n "+" " -" "r" "R" "?"	Set the graphic input= RGB or DVI increment / decrement Reset Query	"1" = RGB "2" = DVI	Graphic Input
Color Table Handling	0x70,"?"	Query the values in the Color Table, at a specific Time period and Color token	Time Period: "DAY" = Day "DSK" = Dusk "NIT" = Night "WHT" = White back "BLK" = Black back Color Token: IHO Presentation library Color token (e.g. NODTA) "BACKL" = OSD- Backlight	Entry of the Color Table for a specific Time Period
Customer Key Handling	0x71,nnnn "?"	Set a 2 Byte hexadecimal Key	0x0000 – 0xFFFF	Key value

OSD / UCL Value Matching Table:

The Table gives you a help in converting the used UCL value to the shown value in the OSD

Function	UCL Value	OSD Value
Backlight Brightness (BRT)		
Mean:	0	0
Minimum:	0	0
Maximum:	255	255
Brightness Control (MCC)		
Mean:	64	0
Minimum:	0	-64
Maximum:	127	63
Contrast Control (MCC)		
Mean:	128	0
Minimum:	0	-128
Maximum:	255	127

4.1.1.6 **PowerOn State Information “POV”**

This command must be sent to the monitor, if you want to read the PowerOn cycles and the current PowerOn state of the monitor. This is only a request command, and no data must be sent to the monitor.

The BPM Monitor answers to this command with an ACK attention code. The DATA field contains three data values that are the current state and the number PowerOn cycles. If no answer is, send in a timeout time the command failed.

The first bytes informs about the state of the monitor (0x00 for Off and 0x01 for On) and the other two bytes about the number of Power On cycles.

If no answer is, send in a timeout time the command failed.

The PowerOn Cycles are calculated with the following formula:

$$\text{Power_On_Cycles} = (\text{HI-Byte} \ll 8) | \text{LO-Byte}$$

*) Left Shift **) Logical OR

Example:

Request command PowerOn Cycles:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK
0x07	0xFF	0x50	0x4F	0x56	0x00	0x04

Acknowledge Operational state: On and PowerOn Cycles: 285

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	DATA	DATA	IDCHK
0x06	0xFF	0x50	0x4F	0x56	0x03	0x02	0x01	0x01	0x1D	0xE0

Steps to extract Information:

- 1) The most left 0x01 means the Monitor is in state on
- 2) HI-Byte = 0x01 LO-Byte=0x1d
 Shift calculation: (0x01 << 8) = 0x0100
 Power_On_Cycles = 0x0100 | 0x1d = 0x11d (285 decimal)

4.1.1.7 Temperature Value Information "TVC"

This command must be sent to the monitor, if you want to read the temperature condition inside the monitor.

This is only a request command, and no data must be sent to the monitor.

The BPM Monitor answers to this command with an ACK attention code. The DATA field contains three data values. The first byte contains the maximum temperature occurred inside the monitor.

If no answer is, send in a timeout time the command failed. The second byte informs about the current temperature and the third byte about minus temperature. All byte in the data occurs in two complements notation (see below example under Point 3).

Example:

Request command Temperature value:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK
0x07	0xFF	0x54	0x56	0x43	0x00	0x0C

Acknowledge Temperatures Max. = 43°C Current = 38°C Min. = -34°C

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	DATA	DATA	IDCHK
0x06	0xFF	0x54	0x56	0x43	0x03	0x0A	0x2B	0x26	0xDE	0xD0

Steps to extract Information:

- 1) The Maximal Temperature is 0x2B, the current Temperature is 0x26 and the Minimal Temperature is 0xDE
- 2) Analyze if the temperature is positive or negative
 - a. 0x2B in Binary is 0010 1011, so the leftmost bit is 0 so the temperature is Positive
 - b. 0x26 in Binary is 0010 0110, so the leftmost bit is 0 so the temperature is Positive
 - c. 0xDE in Binary is 11011110, so the leftmost bit is 1 so the temperature is Negative
- 3) The Positive temperatures can be used directly, see under above Point 2) items a. and b. The Negative value (c.) needs a two complements conversion
 - a. Maximal Temperature is 0x2B = 43 degree Celsius
 - b. Current Temperature is 0x26 = 38 degree Celsius
 - c. Minimal Temperature we do the following steps (Byte [NOT (value) +1] * (-1))
 - i. Toggle all bits in 0xDE: 11011110 -> 0010 0001
 - ii. Add On to the inverted value: 0010 0001 +1 = 0010 0010
 - iii. The absolute Temperature is 0010 0010 is hex 22 in decimal 34
 - iv. So the current Temperature condition inside the monitor is -34 degree Celsius

4.1.1.8 **Monitor Uptime Information “UTM”**

This command must be sent to the monitor, if you want to read the operating time of the monitor. The BPM Monitor answers to this command with an ACK attention code. This is only a request command, and no data must be sent to the monitor. The DATA field contains Data value, which is the operating time. The first two bytes informs about the days, and the third byte about hours of operation. If no answer is, send in a timeout time the command failed.

Example:

Request command Uptime:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK
0x07	0xFF	0x55	0x54	0x4D	0x00	0x03

Acknowledge Uptime: 2 days and 2 hours:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	DATA	DATA	DATA	IDCHK
0x06	0xFF	0x55	0x54	0x4D	0x03	0x01	0x00	0x02	0x02	0xFB

4.1.1.9 **Monitor ID Model/Version Number “VER”**

This command must be sent to the monitor, if you want to read the manufacturer specific monitor type and the UCL major and minor version numbers.

This version string is hard coded, and handled by Baytek. No data shall be sent within this command. Future revisions, such as changes to the hardware or the TFT Display shall be coordinated with a different UCL Software Version Numbers.

The BPM Monitor answers to this command with an ACK attention code. The DATA field has a unique one-byte monitor model code. The next two bytes contain a major and a minor version code:

- VER0 Byte = Monitor ID
- VER1 Byte = Major Firmware UCL-Version ID
- VER2 Byte = Minor Firmware UCL-Version ID

Example:

Request command Monitor ID / Version Number:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK
0x07	0xFF	0x56	0x45	0x52	0x00	0x0C

Acknowledge Monitor ID 1 and Version 1.0:

ATTN	ADDR	CMD 0	CMD 1	CMD 2	LEN	IHCHK	“VER0”	“VER1”	“VER2”	IDCHK
0x06	0xFF	0x56	0x45	0x52	0x03	0x0A	XxXX	XxXX	XxXX	XxXX

VER0, VER1 & VER2 values:

Typ ID	VER0	VER1	VER2	Readout Value (Decimal)
BPM 719-A with AVD3	0x01	0x01	0x00	Monitor ID / UCL Ver.: 1.1.0
BPM 719-DA/-RDA with AVD5	0x02	0x02	0x00	Monitor ID / UCL Ver.: 2.2.0
BQM 817-DA/-RDA with AVD5	0x10	0x02	0x00	Monitor ID / UCL Ver.: 10.2.0
BPM 720-DA/-RDA with AVD5	0x20	0x02	0x00	Monitor ID / UCL Ver.: 32.2.0
BPM 723-DA/-RDA with AVD5	0x30	0x02	0x00	Monitor ID / UCL Ver.: 48.2.0
BPM 722-DA/-RDA with AVD5	0x40	0x02	0x01	Monitor ID / UCL Ver.: 64.2.1
BPM 726-DA/-RDA with AVD5	0x50	0x02	0x01	Monitor ID / UCL Ver.: 80.2.1
BPM 724-DA/-RDA with AVD5	0x60	0x02	0x01	Monitor ID / UCL Ver.: 96.2.1

4.1.1.10 **Special Command**

The BPM Monitor controller contains two Command Interpreter, UCL and BCL.

BCL means Baytek command language, which control the monitor by sending special ASCII commands. After power up, the RS232, port works in UCL mode. To switch from the default power up UCL to BCL, send “\$\$\$” to the monitor.

The standard Baytek BCL is now available. A switch back from BCL to UCL is only possible after power down and power up.

5. VERSION CHANGES

Version	Date	Changes
0.2	August 31, 2006	OSD Menu items update UCL Commands update
1.0	September 8, 2006	Buzzer on separate connector DB-9 connector and specifications MTBF 40.000
1.1	March 9, 2007	DVI Interface added OSD features added Test Reports added Product name changed from BPM 723-A to BPM 723-DA
1.2	March 15, 2007	UCL features added
1.3	May 31, 2007	UCL features added
1.4	July 6, 2007	UCL features added and corrected
1.5	November 13, 2007	New pictures included
1.6	January 23, 2008	Human interface corrected, UCL features corrected, test reports added
1.7	February 21, 2009	Environmental Specifications (item per item), -RDA product variants and Approval Certificates added.
1.8	April 05, 2009	Compass Safe Distance Specifications added (Page 22). Monitor Software Revision changed to item 2.1.3 (Page 10). BSH Certificate No. 514 added.
1.9	October 13, 2009	UCL features added
2.0	May 12, 2011	Viewing Distance added (page 8/51), "BRILL" and "DEFAULT" added (page 11/51).
3.0	June 6, 2011	Display-Backlight unit changed from CCFL to LED technology IEC 60936 -1/-2/-3 radar approval level up-graded to IEC 62288 / IEC 62388 approval level
4.0	November 9, 2012	AC-Line Output added, cooling fans type changed, smaller chassis dimensions (compatible to the actual and older standards)
4.1	November 29, 2012	Order Information removed



Conformance test report of a

Flat Panel Display for use as Radar - and ECDIS - Monitor

Equipment under test: **23.1" TFT Flat Panel Display**

Type: BPM 723-DA-AC-BZ

Applying test standards: IEC 60936-1 (Edition 1.1, 2002) Section 3.5
IEC 60936-2 (Edition 1, 1998) Section 3.5
IEC 60936-3 (Edition 1, 2002) Section 4.2, 4.3
IEC 61174 (Edition 2, 2001) Section 6.7.3.2
IEC 60945 (Edition 4, 2002) Sections 6.1 – 6.4,
11.1 – 11.2, 13, 14
and 15

Test Report No.: BSH/46162/0070558/08

Applicant: Baytek Industriesysteme GmbH
Breslauer Str. 2a
85386 Eching
Germany

Hamburg,
14. February 2008
Federal Maritime and
Hydrographic Agency

by order



Arite Poppner
Test engineer

by order



Jochen Ritterbusch
head of laboratory /
section

nach DIN EN 17025
akkreditiertes Prüflaboratorium

Federal Maritime and Hydrographic Agency
Bernhard-Nocht-Str. 78
D-20359 Hamburg
Germany



DAT-P-086/98-01

TYPE APPROVAL CERTIFICATE

DNV-GL

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No. **14 166 - 15 HH**

Company **Baytek Industriesysteme GmbH**

**Breslauer Str. 2A
85386 Eching, GERMANY**

Product Description **Monitor 23,1"**

Type **BPM 723-DA-AC-xx-xx, BPM 723-DA-DC24-xx-xx
BPM 723-RDA-AC-xx-xx, BPM 723-RDA-DC24-xx-xx**

Environmental Category **C / EMC 1 / IEC 60945 protected**

Technical Data /
Range of Application **The BPM 723-DA-series displays and BPM 723-RDA-series displays are equipped with high performance 23" (in diagonal) color TFT flat panels with WUXGA (1600x1200 pixels) maximum resolution with up to 16 million simultaneous colors which may be used for general applications and especially for navigational applications (RADAR, ECDIS) or engine room area on board of ships and other offshore craft and platforms.**

Power supply:

**BPM 723-DA-AC-xx-xx and BPM 723-RDA-AC-xx-xx: 115VAC/230VAC 50/60Hz
BPM 723-DA-DC24-xx-xx and BPM 723-RDA-DC24-xx-xx: 24VDC**

Options xx-xx:

**BZ = Buzzer, HG = Handles, T = Touch Screen, FO = Foll Keyboard,
GF = Glass Front, BPM 723-300 IEC60945 STATIV**

Note:

The monitor needs to be listed in the specific Radar/ECDIS Type Approval Certificate

Test Standard **Test Requirements for Electrical / Electronic Equipment and Systems (VI-7-2), Edition 2012, IEC 60945(2002) including Corrigendum 1(2008) , IEC 61174(2008), IEC 62288(2014), IEC 62388(2013)**

Documents **Test report : 51117-061101-1, 51117-061077, 51117-061101-2,
69594-32445-2e, DNV-GL 9065-1416615-BPM723**

Remarks **This certificate is issued on the basis of GL Guidelines for the Performance of Type Approvals, Chapter 1 - Procedure (VI-7-1), Edition 2007.**

Valid until **2020-04-07**

Page **1 of 1**

File No. **1.A.06**

Hamburg, **2015-04-08**

Type Approval Symbol



DNV GL


Marco Rinkel


Harald Bluhm