

# OLÓRIN

## Display User's Manual



### ***MedicLine***

MC191D, MC192D, MC221D, MC241D



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# Preface





## Thank you for purchasing this Olorin LCD Monitor.

To get the full benefit of the features that this product offers you, it is important that you read this User's Manual which, among other things, will explain how to properly install and operate the monitor. In this user guide there are detailed product specifications, explanations for many of the technical terms used in this manual as well as information on regulatory approvals, cleaning, service instructions, warranty terms, waste disposal and some other useful information.

## It is of utmost importance that you carefully read and follow the safety instructions and safety notices included in this User's Manual.

Failure to comply with these instructions could in some instances cause bodily harm to yourself or other persons and/or un-repairable damage to the product or to other attached devices / appliances.

Throughout this manual the following symbols are used to guide you to the proper use of the product:

Symbols	
	Expresses DO NOT.
	Person could be at risk of severe injury or death.
	Person or properties could be at risk of injury or damage.
	Expresses MUST DO.

Keep this Users Manual in an easy accessible and safe place for future reading of it. If you lose your copy, you may request a new one by contacting us at our internet home page [www.olorin.com](http://www.olorin.com).

*Olorin reserves the right to change the specifications of this product without any notice. Such changes could cause the operation of the product to be slightly different from the descriptions in this copy of the Users Manual.*

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# Product Features

## Standard delivery

The product is normally delivered in 2 main parts, which, when mounted together, form a normal monitor for desktop use.

- a LCD panel with TFT picture element which also contains the lamps for the backlight along with necessary electronics and cable connectors as well as power connector. These parts are mounted inside a plastic housing.
- a base unit (stand) to be mounted at the VESA holes at the back of the panel.

For certain applications, when the monitor is to be placed on a wall or built into a desk, then only the LCD panel part is delivered. In these cases it is quite often delivered with the plastic housing removed in what is called “open frame”. Certain other options or special mounting components might have been pre-installed.



*Warning*

When the monitor has been delivered as open frame there is a greater risk to come in contact with electric parts which could cause harm to yourself or your property. It should therefore only be handled with special precaution and only by properly trained service personnel.

## Power management

This unit has power management system. The monitor will go into “sleep mode”, where power consumption is less than 5W, whenever either horizontal or vertical signals or both disappear. The monitor’s presence sensor can also recognize if someone is sitting in front of the monitor and turn it on and off automatically. The monitor is using low power LED backlight.

## High performance panel element

The color LCD panel used in this product is specifically designed for advanced applications such as viewing digital X-ray images. ALS (Automatic Luminance Stabilization) circuits gives a stable picture for the life of the product. ALC (Automatic Luminance Control) circuits will automatically adjust for the decay of the backlight lamps. It has LED backlight for lower power consumption and longer product life.

## Front sensor for calibration and quality assurance

The monitor is equipped with a front sensor used for stabilizing the calibrated luminance. It is also used for un-attended calibration and quality checks. The monitor is bundled with PerfectLum™ calibration and quality assurance software.

## Preloaded DICOM curve

The monitor has a preloaded Barten DICOM curve for use as a plug-n-play X-ray review display.

## Ergonomic features

To ease eyestrain on the user, the panel features excellent viewing angles. In addition, the base unit can be adjusted to fit the individual user’s need by adjusting the height and tilt of the monitor.

## Ambient light sensor

The Ambient light sensor measures the luminance around the monitor and can be used for optimal calibration and quality assurance. The sensor can also be used to warn the user that the ambient light is too strong for the workplace.

## Intended use of this product

This product has been designed and developed for use as a visual output device for direct connection to a Personal Computer and PC compatible devices as well as other video generating equipment, such as cameras. The product will accept industry standard video signals coming over cables with industry standard type connectors. The product will operate and function properly in normal office environment and under conditions as specified in the Product Specification chapter.



*Warning*

Attempting to use the product for any other purpose than its intended use or connecting to other devices could cause damage to the product and / or to other property and equipment. There could also be a risk of bodily harm to yourself or other persons.

The product operates on 12V (some on 24V) DC power and must be connected thru the AC 100-240V, 50-60Hz to 12V DC adapter (or 24V DC adapter) which is included with the product. Power to the adapter should be coming from an ordinary grounded AC 100-240V power outlet.



*Warning*

Never try to connect the product to any other power source than the 12V/24V adapter delivered together with the product. There would be a risk of electrical shock which could cause bodily harm, possibly even death. Most certainly such electrical shock will damage the product.

The product can also be delivered with certain options installed. Such options could be touch panel or other special accessories.



*Warning*

**All other uses of the product, including but not limited to attempts such as;**

- **connection to other types of power sources**
- **using other types of mounting or placement of the product**
- **connection to other devices than those for which the monitor has been designed.**

**will void any and all warranties of the product and the manufacturer will not be responsible or libel for any bodily injury or property damage either directly or indirectly caused by such non-intended use of the product.**

## Intended Markets

Olorin products are developed primarily for sales and installation in countries within Europe and North America. The products comply with all regulations and directives issued by the European Union and many also comply with regulations for the United States.



*Warning*

The products are not intended for sales and/or installation in countries, which require other or additional mandatory approvals than those required by the authorities of the European Union or the United States.

Consult the product identification label or product specification for regulatory approvals that apply to this product.

# Safety Precautions

It is important that you read through the following notes of Safety Precautions to avoid any damage to the Product, yourself or other property. Following these precautions will also ensure that you get the best use of the Product.



*Warning*

**DO NOT OPEN THE PRODUCT.** There are no user serviceable parts inside. Because of high voltage inside there is a risk of bodily injury or death. Only authorized and qualified service personnel should maintain the product.

## Cautions when setting up



*Caution*

Do not put the unit on unstable places (on a wanky table or in an inclined place), which might cause injuries if it falls down.



*Caution*

Do not place the unit where it is subject to direct sunlight or near any heating device. This could cause overheating resulting in damage to the product and eventually causing a fire.

## Cautions when using



*Warning*

Do not put the unit in such a place where there is bad air circulation, dust, humidity, oily smoke or steam. It may lead to a fire.



*Caution*

Do not put any metal materials or flammable foreign objects into the unit through the vent holes. It may lead to electric shock and/or fire. Immediately disconnect the unit from the power outlet and contact your local re-seller for service.



*Caution*

Scratching or hitting with hard objects may damage the unit.



# Safety Precautions



*Warning*

Do not use the unit turned over on its back, put on its side, or upside down. These positions may cause the heat that the unit generates to accumulate inside the unit. Such overheating can cause damage to the product and eventually start a fire.



*Caution*

When using the unit for several hours, you should take a 10-15 minute break every hour to reduce eyestrain. Failure to do so could cause injury to your eyes.



## Abnormal circumstances



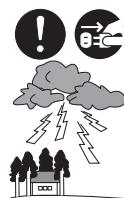
*Warning*

In case of any abnormality such as odor, sound, and overheat taking place, immediately turn off the power and disconnect the plug from the outlet. For assistance contact your local re-seller.



*Warning*

In the event of thunder, immediately turn off the power and disconnect the plug from the outlet. Lightning strikes may cause electric shock and/or fire.



*Warning*

In the event of broken panel and leaking liquid crystal, do not inhale, swallow, or touch the liquid crystal. It may cause you to get poisoned and/or having a skin irritation. If you put it in your mouth, immediately gargle with water and contact a doctor to get a checkup. In case of getting it on your skin and/or cloth, wipe it off with alcohol and rinse them.





# Safety Precautions

## Maintenance



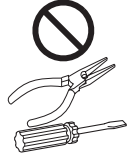
*Warning*

Do not remove the plastic cabinet. There are high voltage parts inside that may lead to electric shock. Ask a re-seller for adjustment and inspection.



*Warning*

Do not remodel or repair. It may lead to fire, electric shock, or injuries.



*Caution*

Clean the dust inside the display once a year. The dust that accumulates inside the unit may lead to fire. Ask a re-seller for adjustments and inspection.



*Caution*

Disconnect the plug from the outlet when you do not use the unit for a prolonged period.



# Regulatory Tests and Certifications

All Olorin products have normally been tested to comply with all mandatory Regulatory requirements for the markets where the products are sold. Approvals are listed by each Regulatory Agency under the name of the manufacturer and model number as specified on the Product Identification Label. Copies of such approvals can be requested by contacting Olorin AB via [www.olorin.com](http://www.olorin.com).

**Approvals applicable for this product is listed in the Product Specification section of this manual.**

## Tests and Approvals for VistaLine Series

Each product in the VistaLine series has been tested as an IT-category product for normal office environment and for use as a desktop monitor. They comply with the following standards and regulations:

- CE for use within the European Union member states
- WEEE for use within the European Union member states
- RoHS for use within the European Union member states

## Tests and Approvals for MedicLine Series

Each product in the MedicLine series has additionally been tested for risk of electrical shock and to comply with

- MDD directive 93/42/EEC class 1 for the European Union member states
- EN60601-1, EN60601-1-2
- IEC 60601-1

Under these directives and regulations, MedicLine products are complying with the requirements for a Class 1 product with continuous mode of operation. The monitor must not be in direct contact with a patient.



Using any other 12V/24V adapter than the medical approved one delivered with the product or connecting this to a non-grounded power outlet voids the approval.

*Warning*



Before taking the product in use, the person installing it must test that the grounding of the monitor complies with the impedance requirements of the country where it is being installed.

*Warning*



When using at 240 V in the United States, supply must be from center-tapped, 240 V, single phase circuit.

*Warning*

## Test of medical power adapter

The power supply is Class I. Protective earthed parts are only located inside the power supply enclosure and therefore are not accessible. The accessible parts of the enclosure and output are DOUBLE INSULATED from all mains voltage electrical parts. Ground continuity test is not relevant.

Leakage test of the adapter is made by having the measurement equipment connected to the AC plug, no need to open the plastic enclosure.

# Warranty and Limitation of Liability

## Warranty

For details of the warranty please visit Olorin's website, <http://www.olorin.com>

## Limitation of Liability

Olorin AB, including any of its affiliates, manufacturing partners and sales agents, is not liable for any claim for damages including, but not limited to, loss of business profits, disruption of business, change or loss of saved data, when damage is arising from

- fire, earthquakes, actions taken by any third party, any other accidents, intentionally or negligently, improper use of the product by the user, or any use under other abnormal circumstances,
- the use or inability to use this product,
- the use for other purposes than the intended use as described in this document
- malfunctions caused by the combination of connected devices

# Product identification

Affixed to the panel part of the product is a Product Identification Label. It is normally affixed in the connector compartment. This label contains the following information:

- Olorin logo and web address
- Product Family name (i e Olorin MedicLine MC191D)
- Manufacturers product number
- Part number
- Serial Number
- Power information
- Symbols for Regulatory approvals
- WEEE symbol for disposal of the product
- Manufacturers name
- Country of Origin

## Cleaning of the Product



*Caution*

Be careful when cleaning the plastic housing of the panel so that no liquid or other objects will drip down into the product through the ventilation holes. This could cause electric shock and damage the product.

Normal dust and lint particles can be easily wiped off with a soft cloth tissue.

For grease or dirt that is more firmly fixed to the product, the use of a soft and dry micro fiber based cloth tissue will normally remove it all.

You can also use a mild liquid detergent mixed with water for cleaning together with a soft cloth tissue. This will clean both the cabinet and the LCD panel well. For the LCD panel you can also use isopropyl alcohol based liquids (without abrasive) or non-ammoniac glass cleaner.

When cleaning the LCD panel you will get the best result if you clean the panel when its surface has cooled down to normal room temperature. On a warm panel the liquid evaporates too quickly leaving traces of the cleaning. Afterwards wipe the surface dry with another soft cloth tissue.



*Warning*

When cleaning the cabinet do NOT use thinner, benzene or alcohol as these might damage the plastic and cause the paint to peel off. Do NOT use organic solvent such as acetone and toluene when cleaning the panel.



*Warning*

If you use any liquid for cleaning you must first un-plug the power to the monitor and not connect it again until you are certain that all the liquid particles have evaporated. Failure to do so could result in electric shock.



*Caution*

Do not use any tools with hard or sharp material for cleaning. The panel can very easily be scratched or damaged from such tools.



*Caution*

Do not press hard on the panel when cleaning. This could cause damage to the LCD panel element.

## Disposal of the Product

Do not dispose of the unit with general wastes.

The monitor has been manufactured to comply with the EU directive on RoHS (Reduction of Harmful Substances) but even so the LCD panel contains a small amount of mercury and the monitor should therefore be disposed of according to local laws. Please get information from your local re-seller how collection is handled in your country. For countries that are members of the EU the WEEE directive applies and proper marking is on the product label affixed to the monitor.

# Getting started

Before operating this monitor, please make sure that all items listed below are present in your delivery.

## **Standard Items**

- The LCD monitor panel
- User's manual
- AC/DC adapter
- AC Power cord
- DVI to DVI cable
- DisplayPort to DVI cable

## **Optional Items**

- Base unit with four M4 Screws and Screwdriver

If any of the above items are found missing or if you wish to order the optional items, please contact your reseller.

## **Recommended cable connections**

Olorin recommends that the monitor is connected DVI on the monitor, with either DVI to DVI or DisplayPort to DVI cable, USB should be used for calibration (set Interface to USB in the OSD, see page 23.)

# How to assemble Panel and Base unit

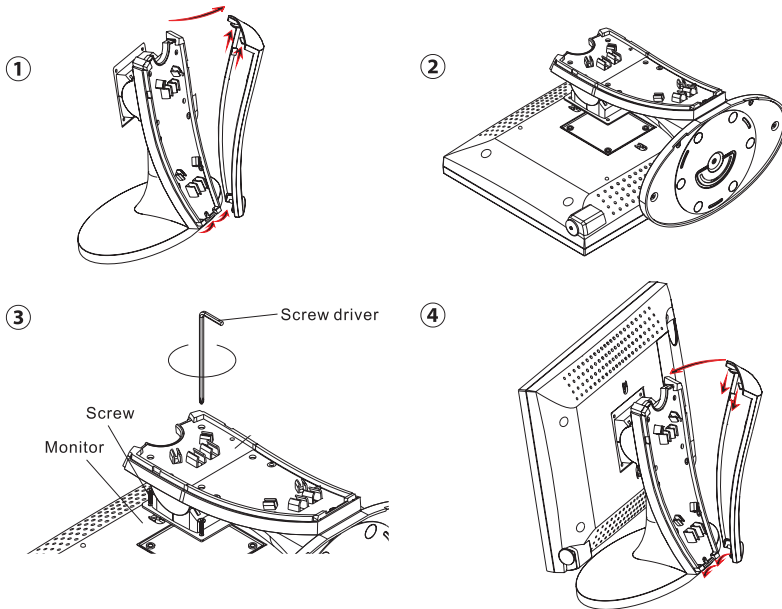
The product normally comes in 2 cartons and you need to assemble the panel and the base unit. A screwdriver and proper screws are included in the box for the base unit.

1. Remove the back of the base unit by grabbing it firmly at the top and pulling it up and backwards.
2. Place the monitor with the front down on a level surface. Make sure that there are no objects on the surface that could damage the panel element. It should be placed so that the OSD wheel is at the lower left corner seen from yourself.

Place the metal plate onto the VESA mounting cut-out on the back of the panel. Hold the bottom of the base unit towards yourself.

Test that you can swing the base unit to the left so that swivel between Landscape and Portrait will be correct.

3. Locate the holes in the back of the base unit through which you can stick the screwdriver to reach and put the 4 screws in place.
4. Remount the back cover.



Caution

If you mount any device using these 4 holes on the back of the panel you must not use screws longer than 10 mm. Longer screws will cause damage which is not covered by the product warranty.

## Mounting on a wall or LCD arm

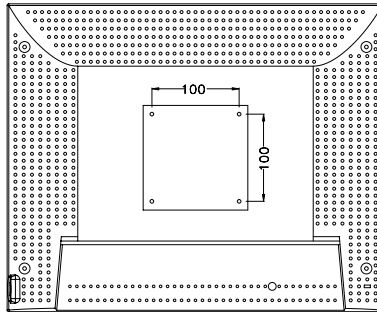
The Monitor has Video Electronics Standards Association (VESA) standard mounting holes tapped into the rear panel. The standard holes are M4 set 100 mm (for 17" and larger monitors) or 75 mm (12" and 15" monitors) apart.

If you intend to mount the monitor on the wall, we strongly recommend that you use wall mount kits with attached M4\*10mm screws and which can hold a load of more than the weight of the monitor. Ensure it is securely and safely installed.



*Warning*

If you mount any device using these 4 holes on the back of the panel you must not use screws longer than 10 mm. Longer screws will cause damage which is not covered by the product warranty.



The position of the connectors can vary between models and they may or may not be covered with a flap.

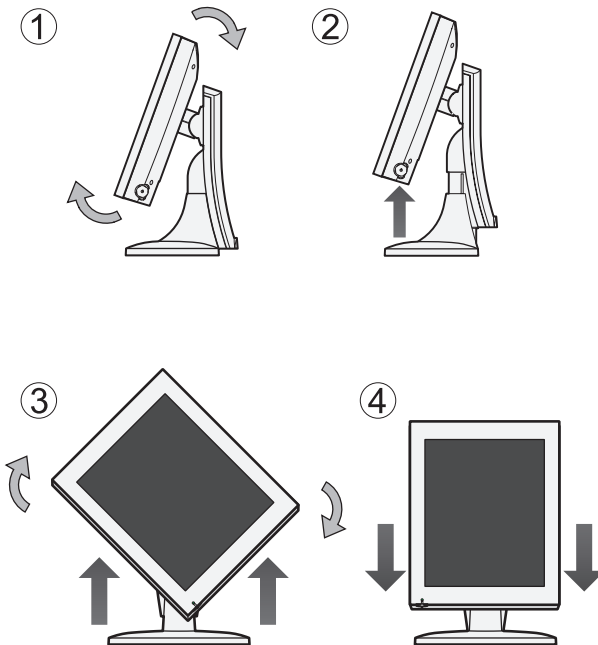


## Rotating the LCD Panel

When setting the LCD display to vertical display (portrait orientation), lift the LCD panel to the top of the base unit as shown in the figure below and rotate it by 90 degrees.

### Procedure

1. Tilt the LCD panel upward. (Perform this procedure before sliding the panel upward.)
2. Lift the LCD panel to the top.
3. Rotate the LCD panel by 90 degrees.
4. Reposition the LCD panel to the bottom while in the vertical position (portrait orientation).



### Display in portrait orientation

Pivot® software or graphics card that enables portrait orientation is necessary.

# Connection Method

No tools are required to connect the LCD monitor to your PC or other device. Simply follow the instructions outlined in the next few pages.

Connectors for the signal cables and power are located on the back of the panel behind the cover lid. Please refer to the diagram on the next page for the connector configuration.

## Connect Power Adapter and Cable

Connect the round shape plug end of the AC/DC adapter to the DC Power input connector of the LCD monitor. Connect the female end of the power cable to the AC power input receptacle on the AC/DC adapter. Then, plug the male end of the power cable into an grounded AC outlet.



Make sure you use the AC to DC adapter delivered with the product.

*Caution*

## Connect Signal cable

On next page you can see which input connectors there are available on your monitor and which cable you should connect depends on your source for the input signal.

## Recommended cable connections

Olorin recommends that the monitor is connected DVI on the monitor, with either DVI to DVI or DisplayPort to DVI cable, USB should be used for calibration (set Interface to USB in the OSD, see page 23.)

## VGA, DVI, HDMI or Displayport output from a PC

If your source is VGA (analog) then use a VGA to VGA cable.

If your source is DVI (digital) then use the DVI-DVI cable supplied with the monitor and connect to the DVI-I connector on the monitor.

If your source is HDMI or Display-Port then you need a converter from HDMI or Display-Port to DVI. Then you connect the DVI-DVI cable between the DVI connector on the monitor and the converter. There are also available HDMI or Display-Port to DVI cables that can purchased from your local reseller.

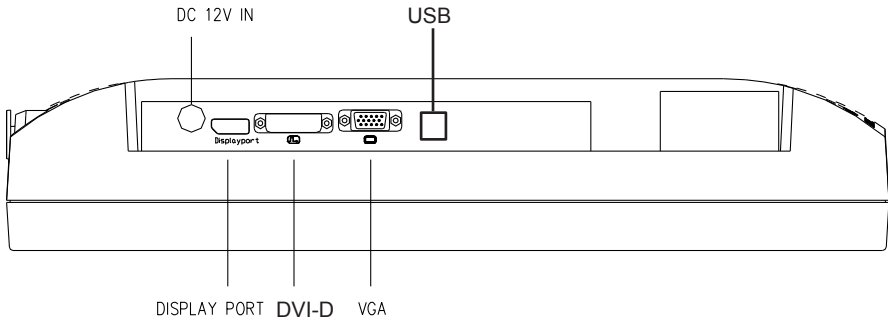


When you disconnect the cord /cables, be sure to hold the connector and not the cable itself. Also make sure you use cables and connectors of high quality.

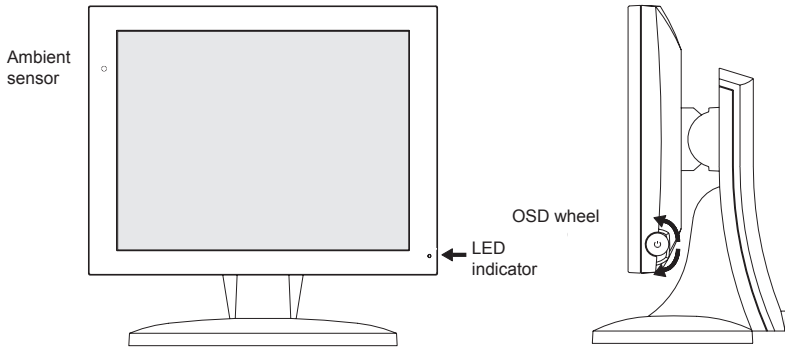
*Caution*

# Input signals

## Connections



# How to Operate



## Control Dial

The Control Dial is a multi-functional device located behind the LED Indicator on the right side of the front bezel. It has three movements—rotate upward, rotate downward and press inward as a button.

### 1. Power On/Off

Press the Control Dial to power the unit on from the off stage (the display is off). To turn the power off, press the Control Dial and hold for at least 1 second until the display turns off.

### 2. OSD Control

While the monitor is on (image on the screen), pressing on the Control Dial activates the OSD. While the OSD menu is active, use the three-way movements of the Control Dial to adjust the monitor.

Rotate Downward:	Move Up/Right, Increase, Larger, More
Rotate Upward:	Move Down/Left, Decrease, Smaller, Less
Button Press:	Execute, Do, Save

### 3. Change of Brightness Setting

If you rotate the Control Dial without first having clicked to enter the OSD, then it will change the brightness setting. This function is disabled when the monitor is in DICOM, Calibration mode or Special Preset mode.

## LED Indicator

This LED indicator turns green when the power is switched ON and the power cord is properly attached. It turns amber when the monitor goes into a power saving mode (Active Off). On some models it will be switched off entirely after 10 minutes to avoid that the lamp will distract your vision. The diode also works in correspondence with user-defined values for ambient light, when the light is outside of these values the LED will blink.

## OSD lock

There is a function that allows the user to lock the OSD, contact [info@olorin.com](mailto:info@olorin.com) for more info. If the OSD is locked, you can still access information about the monitor.

# OSD Adjustment Functions

## PreVu™ On-Screen Display

The LCD monitor features a PreVu™ On-Screen Display(OSD) menu with easily identifiable icons designed to make adjusting your monitor display settings a more user-friendly process. When highlighted, the icon illustrates the control function and a brief instruction to assist the user in identifying which control needs adjustment.

The OSD menu is activated by pressing the Control Dial inward and you can select and adjust the function of your choice by rotating and clicking the Control Dial. The main menu displays a list of control icons and the current video input mode. Rotate the dial to move the highlights to the control you would like to adjust, then press the Control Dial inward to select that control or to activate that function. Depending on the control you selected, a submenu of the control with a status bar will appear. The status bar indicates in which direction, from the factory preset, your adjustments are being made. Rotate the Control Dial to adjust the control.

When you have finished making the adjustments, the setting is saved automatically by exiting the control function. If you do not touch the control dial for 20 seconds, the OSD is automatically exited saving your current settings.

## Menu descriptions

The LCD monitor is capable of accepting digital and analog signal inputs and therefore has two different sets of OSD control functions.

Depending on your input source and also depending on which color mode you have selected there are some functions that are not necessary, cannot be executed or are locked out to comply with certain standards. You will then encounter the message "Not Available" when you try to select such functions.

The following charts show the function tree and brief explanations of the functions.

# Charts of OSD Adjustment Functions

## Info page

### Info page 1

Exit	Closes the OSD menu.
Go to next info page	See the next page with additional information about the monitor.
Go to OSD	Go to the main menu, see below: <b>"Main menu"</b>
Model:	Displays the monitor's model name.
Serial Number:	Displays the monitor's serial number.
FW:	Displays the monitor's firmware version.
ALS FW:	Displays the monitor's ALS firmware version.
Service code:	Displays the monitor's service code.
Color:	Displays the monitor's current Color mode.
Source:	Displays the monitor's active Source input.
Resolution:	Displays the monitor's active Resolution.

### Info page 2

Temp:	Displays the monitor's temperature.
FS:	Displays the Front sensor of the monitor's current value.
Ambient:	Displays if the monitor's Ambient sensor is active and what its current value is.
Presence:	Displays if the monitor's Presence sensor is active and what its current value is.
Hours used:	Displays the number of hours the monitor's backlight has been on.
Hours left:	Displays the estimated remaining life time of the monitor's backlight, for use as a DICOM approved monitor.
On Time:	Displays the time the monitor's backlight has been on since it last started.

## Main Menu

Exit	Closes the OSD menu, in sub menus this option will take up in the tree structure.
Auto setup *1	Adjust monitor to analog signal from graphics card. After you have done the correction it will ask you if the image looks OK, if you answer YES then you will exit the menu. If you answer NO, proceed to Clock / Phase menu.
Brightness	Adjust brightness level. See also special note on brightness adjustment in special situations. Not available in DICOM, Calibration or Special preset color mode.
Contrast	Adjust contrast level. Not available in DICOM, Calibration or Special preset color mode.
Color mode	Sub menu
— User	In a separate sub-menu you can set individual values for Red, Green and Blue.
— DICOM preset	A special color mode intended for viewing of X-ray pictures. Has a preset greyscale curve in accordance with the DICOM standard. Automatically sets the monitor's brightness. When set to this mode the OSD functions for Brightness, Contrast are deactivated. It also locks ALS to ON.
— Special preset	Special customized Dicom mode.
— Calibration	A special color mode intended for viewing of X-ray pictures. With the included software PerfectLum, a calibration curve can be uploaded to the monitor's internal LUT. Automatically sets the monitor's brightness. When set to this mode the OSD functions for Brightness, Contrast are deactivated. It also locks ALS to ON.

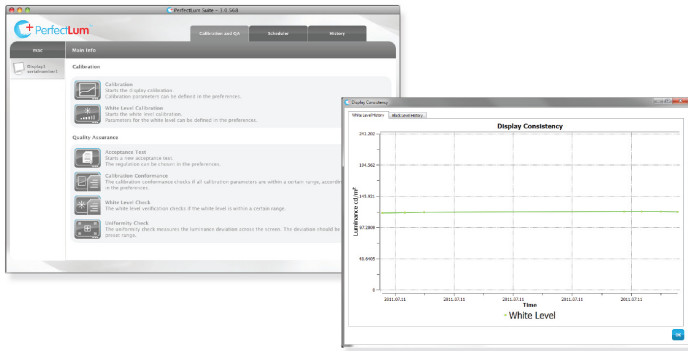
# Charts of OSD Adjustment Functions

## Main Menu ( continued )

Management	Sub menu
— Scaling	Scale the image of the input signal to FULL, 5:4, 4:3, 16:9 or 1:1.
— OSD Display	Sub menu moving the OSD menu on the display.
— OSD H. pos	Move position of the OSD display horizontally.
— OSD V. pos	Move position of the OSD display vertically.
— Language	Select language for OSD. Returns to Main Menu and will from then on show the OSD in the selected language. You can choose between English, French, German, Spanish or Chinese.
— Source	Sub menu for choosing the input source you want to display.
— VGA	Displays the device connected to VGA.
— DVI	Displays the device connected to DVI.
— DisplayPort	Displays the device connected to DisplayPort.
— Recall	If you execute Recall the monitor will be reset to values that are default values at time of delivery.
Sensors	Sub menu for the monitor's different sensors.
— ALS	Luminance stabilization, can be turned ON or OFF. Not available in DICOM, Calibration or Special preset color modes.
— Ambient light	Sub menu for the Ambient light sensor where it can be turned ON or OFF.
— Target 1	Enter the lowest value.
— Target 2	Enter the highest value.
— Presence control	Sub menu for the Presence sensor where it can be turned ON or OFF.
— Delay time	Set the delay time, in minutes (max 9).
— Auto	Reset the sensor.
Max Luminance	Measures the monitor's maximum luminance (cd/m2) and then resets the monitor.
Quick Calibration	Quick correction of calibrated LUT in the Calibration color mode.
Interface	Set the interface used for calibration, either DDC/Ci or USB.

\*1 Only available when VGA input source is active.

# PerfectLum™ Calibration Software



PerfectLum is software to calibrate and verify medical displays that are used for Diagnostics or viewing of medical images. It is developed in a cooperation between Qubyx Ltd ([www.qubyx.com](http://www.qubyx.com)) and Olorin AB.

PerfectLum conforms to all common standards for DICOM calibration; this includes NEMA DICOM 14 GSDF, AAPM TG18, DIN6868-57, JESRA X-0093 and IEC-62563-1. PerfectLum can also be used to perform conformance tests for quality assurance against the current standard.

## Internal LUT

Olorin monitors with front sensor can be calibrated with PerfectLum software and have the values saved in its internal LUT (Look-up Table). Since this LUT is based on 10-bit graphic (1024 levels of grey), the image presented is very smooth when compared to 8-bit graphic (256 levels of grey).

## Reports and diagnostics

PerfectLum saves all history for calibrations and quality assurance tests. The history is visualized in graphs and can be exported to printable reports. The software has a backup function that makes sure everything can be stored safely.

## PerfectLum Remote Management Server

Remote Management Server is an optional feature to PerfectLum. Remote Management enables the user to centralize and schedule all of their calibration tasks and quality assurance tests over a web interface. This means that Olorin monitors with internal LUT and front sensor do not need local assistance, instead everything can be controlled automatically via a remote computer.

## System compatibility

PerfectLum is compatible with all major graphics card and external sensor (used for controlled measurements) manufacturers. This means that an upgrade of existing hardware is often unnecessary. PerfectLum supports all the latest versions of Windows and Macintosh operating systems: Windows 7, Vista, XP, 2000 32/64 and Macintosh OS X 10.4 and up.



# Applicable Signal Timings

The display may not work correctly with timings other than listed below.

⊙ : Recommended timing      ○ : Applied timing      Δ : Pseudo-display timing

Display mode	Resolution		Frequency		19"	22"	24"
	Hor.	Ver.	Hor. (kHz)	Ver. (Hz)			
VGA	720	400	31.5	70	○	○	○
	640	480	31.5	60	○	○	○
VESA	640	480	37.9	72	○		
	640	480	37.5	75	○		
	800	600	35.1	56	○		
	800	600	37.9	60	○	○	○
	800	600	48.1	72	○		
	800	600	46.9	75	○		
	1024	768	48.4	60	○	○	○
	1024	768	56.5	70	○		
	1024	768	60.0	75	○		
	1280	960	60.0	60.0	○		
	1280	1024	64.0	60	⊙	○	○
	1280	1024	80.0	75	○		
	1600	1200	75.0	60		○	
	1920	1080	67.5	60		⊙	○
	1920	1200					⊙
MAC	640	480	35.0	67	○		
	832	624	49.7	75	○	○	
	1024	768	60.2	75	○		

# Specifications

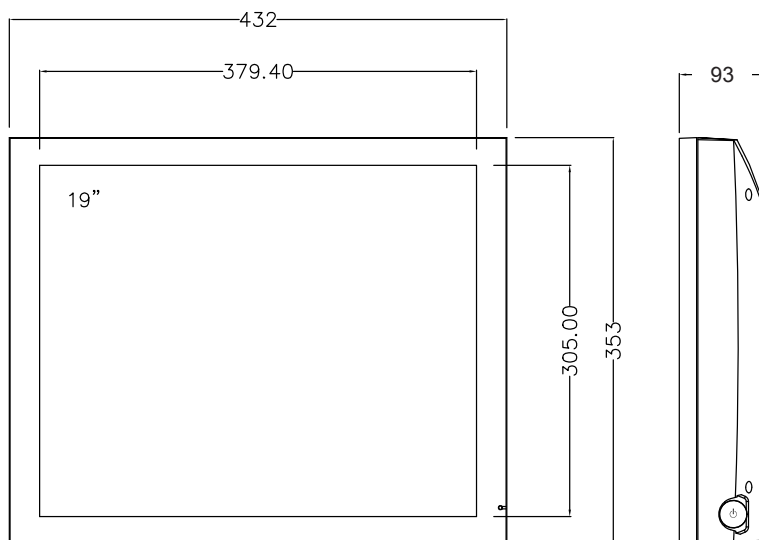
## MC191D

<b>Display</b>	Screen size, Format	19" (376x301 mm), 5:4	
	Brightness, candela/m2	300 cd/m2	
	Contrast	2000:1	
	Resolution (Megapixel)	1280x1024 (1,3 Mpix)	
	Response time	20 ms	
	Viewing angles, H/V	178/178	
	Color depth	16,7M	
	Panel type	MVA	
	Backlight type	LED	
<b>Environmental</b>		<b>Active</b>	<b>Storage</b>
	Temperature, Celcius	0 to 40 C	-20 to 40 C
	Humidity (non-condensation)	20 to 90 %	10 to 90 %
	Air pressure	700~1060 hPa	500~1060 hPa
<b>Input signal</b>	Connections	VGA, DVI, DisplayPort	
	DDC	Yes	
<b>Power</b>	Power supply	External 12V, 4.5A	
	Power consumption	45W (< 2,5 W)	
<b>Functionality</b>	Automatic adjustment	Yes (via OSD)	
	OSD for settings	Yes	
	Speakers	No	
	Luminance stabilization	ALS	
	Pivot	Yes, if supported by graphics controller	
	Protective glass	No	
	Internal LUT	Yes, 10-bit.	
	Internal LUT for calibration	Yes, see chapter "OSD functions"	
	DICOM pt. 14 preset	Yes, 180 cd/m2	
<b>International standards</b>	Medical certificates, *1	CE(EN60601-1, EN60601-1-2), RoHS	
<b>Warranty</b>	Replacement warranty	Two (2) years	

# Specifications

## MC191D

<b>Appearance</b>	Net. weight	6,5 kgs w/o base unit 8,4 kgs w/ base unit
	Measurements (WxDxH)	432 x 93 x 353 mm (utan fot) 432 x 251 x 467 mm (med fot)
	Product color	Graphite grey
<b>Base unit</b>	Height adjustable	Yes
	Tilting and swivel	Yes
<b>Mounting</b>	Kensington lock	Yes, prepared
	VESA standard	Yes, 100 mm



Please note that values for Brightness, Contrast, Response time and Viewing angles are nominal values. Due to delicate manufacturing techniques, these values can be different for each individual monitor.

# Specifications

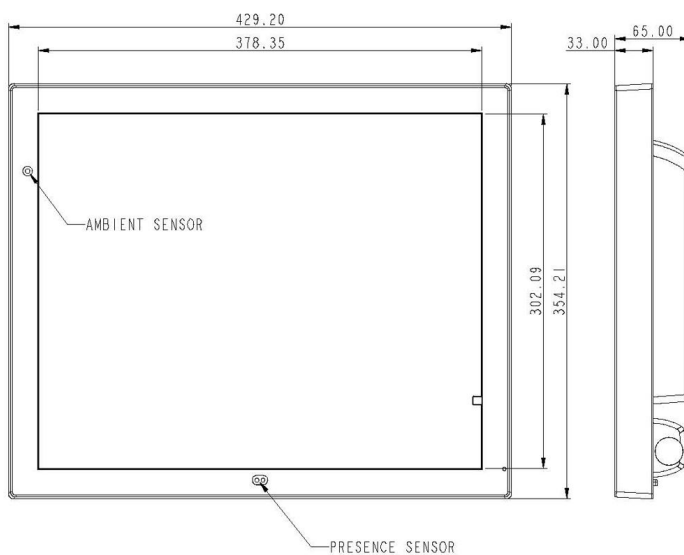
## MC192D

<b>Display</b>	Screen size, Format	19" (376x301 mm), 5:4	
	Brightness, candela/m2	300 cd/m2	
	Contrast	2000:1	
	Resolution (Megapixel)	1280x1024 (1,3 Mpix)	
	Response time	20 ms	
	Viewing angles, H/V	178/178	
	Color depth	16,7M	
	Panel type	MVA	
	Backlight type	LED	
<b>Environmental</b>		<b>Active</b>	<b>Storage</b>
	Temperature, Celcius	0 to 40 C	-20 to 40 C
	Humidity (non-condensation)	20 to 90 %	10 to 90 %
	Air pressure	700~1060 hPa	500~1060 hPa
<b>Input signal</b>	Connections	VGA, DVI, DisplayPort, USB for calibration	
	DDC	Yes	
<b>Power</b>	Power supply	External 12V, 4.5A	
	Power consumption	45W (< 2,5 W)	
<b>Functionality</b>	Automatic adjustment	Yes (via OSD)	
	OSD for settings	Yes	
	Speakers	No	
	Luminance stabilization	ALS	
	Pivot	Yes, if supported by graphics controller	
	Protective glass	No	
	Internal LUT	Yes, 10-bit.	
	Internal LUT for calibration	Yes, see chapter "OSD functions"	
	DICOM pt. 14 preset	Yes, 180 cd/m2	
<b>International standards</b>	Medical certificates, *1	CE(EN60601-1, EN60601-1-2), RoHS	
<b>Warranty</b>	Replacement warranty	Two (2) years	

# Specifications

## MC192D

<b>Appearance</b>	Net. weight	5,2 kgs w/o base unit 6,9 kgs w/ base unit
	Measurements (WxDxH)	429.2 x 397.1 x 175 w/ base unit
	Product color	Graphite grey (standard)
<b>Base unit</b>	Height adjustable	No
	Tilting and swivel	Tilt
<b>Mounting</b>	Kensington lock	Yes, prepared.
	VESA standard	Yes, 100 mm



Please note that values for Brightness, Contrast, Response time and Viewing angles are nominal values. Due to delicate manufacturing techniques, these values can be different for each individual monitor.

# Specifications

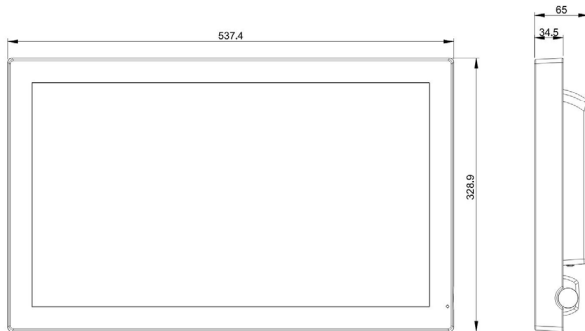
## MC221D

<b>Display</b>	Screen size, Format	21,5" 16:9	
	Brightness, candela/m2	250 cd/m2	
	Contrast	1000:1	
	Resolution (Megapixel)	1920x1080, 2,1 MP	
	Response time	14 ms (GTG)	
	Viewing angles, H/V	178/178	
	Color depth	16,7M	
	Panel type	IPS	
	Backlight type	LED	
<b>Environmental</b>	<b>Active</b>	<b>Storage</b>	
	Temperature, Celcius	0 to 40 C	-20 to 40 C
	Humidity (non-condensation)	20 to 90 %	10 to 90 %
	Air pressure	700~1060 hPa	500~1060 hPa
<b>Input signal</b>	Connections	VGA, DVI, DisplayPort, USB for calibration	
	DDC	Yes	
<b>Power</b>	Power supply	Ext. Adapter 12v	
	Power consumption	45W (< 2,5 W)	
<b>Functionality</b>	Automatic adjustment	Yes (via OSD)	
	OSD for settings	Yes	
	Speakers	No	
	Luminance stabilization	ALS	
	Pivot	Yes, if supported by graphics controller.	
	Protective glass	No	
	Internal LUT	Yes, 10-bit.	
	Internal LUT for calibration	Yes, if supported by graphics controller.	
DICOM pt. 14 preset	Yes, 170 cd/m2		
<b>International standards</b>	Medical certificates, *1	CE(EN60601-1, EN60601-1-2), RoHS	
<b>Warranty</b>	Replacement warranty	Two (2) years	

# Specifications

## MC221D

<b>Appearance</b>	Net. weight	4,9kg w/o base
	Measurements (WxDxH)	537,4 x 65 x 328,9 mm (without base)
	Product color	Graphite grey
<b>Base unit</b>	Height adjustable	No
	Tilting and swivel	Tilt
<b>Mounting</b>	Kensington lock	Yes, prepared
	VESA standard	Yes, 100 mm



Please note that values for Brightness, Contrast, Response time and Viewing angles are nominal values. Due to delicate manufacturing techniques, these values can be different for each individual monitor.

# Specifications

## MC241D

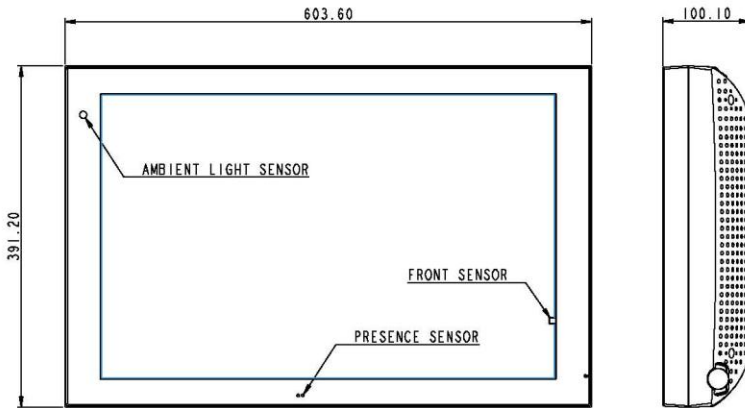
<b>Display</b>	Screen size, Format	24" 16:10	
	Brightness, candela/m2	300 cd/m2	
	Contrast	1000:1	
	Resolution (Megapixel)	1920x1200, 2,3 MP	
	Response time	14 ms (GTG)	
	Viewing angles, H/V	178/178	
	Color depth	16,7M	
	Panel type	IPS	
	Backlight type	LED	
<b>Environmental</b>		<b>Active</b>	<b>Storage</b>
	Temperature, Celcius	0 to 40 C	-20 to 40 C
	Humidity (non-condensation)	20 to 90 %	10 to 90 %
	Air pressure	700~1060 hPa	500~1060 hPa
<b>Input signal</b>	Connections	VGA, DVI, DisplayPort, USB for calibration	
	DDC	Yes	
<b>Power</b>	Power supply	Ext. Adapter 12v	
	Power consumption	45W (< 2,5 W)	
<b>Functionality</b>	Automatic adjustment	Yes (via OSD)	
	OSD for settings	Yes	
	Speakers	No	
	Luminance stabilization	ALS	
	Pivot	Yes, graphics card functionality required.	
	Protective glass	No	
	Internal LUT	Yes, 10-bit.	
	Internal LUT for calibration	Yes, see chapter "OSD Functions"	
	DICOM pt. 14 preset	Yes, 170 cd/m2	
<b>International standards</b>	Medical certificates, *1	CE(EN60601-1, EN60601-1-2), RoHS	
<b>Warranty</b>	Replacement warranty	Two (2) years	



# Specifications

## MC241D

<b>Appearance</b>	Net. weight	7,6 kg kg
	Measurements (WxDxH)	620 x 390 x 102 mm (without base)
	Product color	Graphite grey
<b>Base unit</b>	Height adjustable	No
	Tilting and swivel	Tilt
	Kensington lock	Yes, prepared
<b>Mounting</b>	VESA standard	Yes, 100 mm



Please note that values for Brightness, Contrast, Response time and Viewing angles are nominal values. Due to delicate manufacturing techniques, these values can be different for each individual monitor.

# Special Considerations for LCD Panels

Manufacturing of LCD panels is very delicate with large panel elements being manufactured in one unit and then cut to smaller sizes to be used in different products. In addition a panel consists of several layers of components (back-light lamps, diffusers, electronics and color filters). There are different technologies used with each having its advantages and disadvantages resulting in end user products with different specifications even when taken from the same manufacturing batch. Below are explanations to some observations that can be made and which are not considered defects since they are merely problems inherent in the technology of LCD monitors. Over time, the performance of the panel will also change. Some of the information below refers to color monitors only.

## Native resolution

All panels have a fixed number of pixels in both horizontal and vertical directions. For instance is a 19" panel normally built with 1280 pixels horizontal and 1024 vertical giving a native resolution of 1280x1024. At this resolution you will get the sharpest picture and it is therefore recommended that you use the native resolution. Thru scaling technologies it is possible to use other resolutions but the picture will be less sharp. Some text will appear to have shadows.

## Native color temperature

Most commonly LCD panels are manufactured to have a color temperature of 6500K (Kelvin degrees) for full white picture. The color temperature can vary with shade of grey being showed. For instance it could be 7500K at 50% grey and more than 9000 at 90% grey. For an individual panel the color temperature at full white can also vary by +/- 15%. Inside the panel there is a color filter and over time this will age and become more yellow in its color tone. Therefore, over time, the color temperature will gradually go lower so that at full white it could come down to 5000K.

## Typical values

In product specifications there are values for brightness, contrast, view angles etc. The values are given as "typical values" meaning that actual value for any given product can vary by up to 20% from this value. For instance, a product specified to give 300 candela as typical maximum value for brightness may for individual samples vary from 240 candela to 360 candela. The values specified are for

a new product. Due to wear of the backlight lamps the values will change over time and gradually become lower.

## Uniformity and Mura patterns

Depending on the placement of the backlight lamps, how many they are and the size of the panel the brightness over the entire panel will vary by up to 20%. Generally the highest brightness is in the centre of the panel and becoming gradually lower towards the outer edges. This does not follow a linear curve and there might also be "areas" on the screen where there is a noticeable difference in the uniformity. Such clouded areas are referred to as "Mura" and are more related to the panel itself than to the backlight. These Mura patterns are different in size and shape and are color and grayscale dependent since they are a result from deterioration of the liquid crystal alignment layer. Mura is most commonly caused by long term operation under high ambient temperature and is a phenomenon that cannot be repaired.

## Non-performing pixels

Each pixel on the panel actually consists of 3 sub-pixels (one for each of Red, Green and Blue). A 19" panel with 1280x1024 therefore has almost 4 million sub-pixels. It can happen that a pixel can get stuck in ON status (bright pixel defect) or in OFF status (dead pixel defect) or in an in-between status (low bright pixel defect). Usually such defects only affect a sub-pixel and not an entire pixel. The defect can therefore only be seen at certain color settings. The ISO 13406-2 standard specifies how many pixel defects that are acceptable before an entire panel will be considered faulty.

## Special Considerations for LCD Panels

Olorin products are warranted to follow this standard as a Class II product.

### **Image sticking**

If the same image is shown for a long period of time there is a risk for “image sticking”. This is a result of that the thin film transistors will get stuck in a certain position and continue to show that image even when a new image is sent to the panel. The image will disappear if you put a full white picture on the monitor for several hours. The best solution is to have a screen saver that moves around on the screen so that no static image is constantly shown.

### **Slow operating in cold environments**

The thin film transistors contain some liquid that will cause them to operate slowly in cold temperatures. When temperature inside the panel has increased to normal room temperature, the speed will be up to normal again.

### **Cable length and input signal**

When using long cables from the video source (PC, camera etc) to the monitor the signal level will be lower and cause distortions in the picture shown. A low quality graphic board could also cause such problems. Always use high quality graphic boards and signal cables.

## Longer life for your monitor

The components that have biggest influence on the useful life of the product are the backlight lamps. These are made of CCFL (Cold-cathode Fluorescent Lamp) or LED (Light Emitting Diode). Over time these will decay and give less and less light. They generally have a specification of 40,000 hours before they are worn out. If they are constantly on one year of use corresponds to just over 8,000 hours and thus a life of 5 years.

### **There are ways to improve the useful life.**

The most radical and efficient way is to always switch the monitor off when not used.

The second best is to use the Power Save feature within the PC's DPMA system. This will not switch off the monitor entirely but the backlight lamps will be switched off which is the important thing. When you start to use the keyboard or mouse, the monitor will be switched on within a couple of seconds.

**PLEASE, NOTE THAT A SCREENSAVER WILL NOT SWITCH OFF THE BACKLIGHT LAMPS AND THUS IS NOT A SOLUTION**

### **FOR LONGER LIFE.**

The higher the luminance is set on the monitor the greater is the wear of the backlight lamps. All monitors have the facility to adjust brightness. Never set this at maximum since this will cause the lamps to decay faster. A setting at 50% will be sufficient for use in office environment.

### **Gradual change of color**

If the backlight is a CCFL type, as the lamps ages they will show a warmer color temperature which can be perceived as more yellow for white color than it was initially when the monitor was new. There are color filters in the panel which also will age and add to the yellowish color tone.

You can usually from the monitors OSD set your own color and by setting the value for blue higher than red and green will change the color temperature back to more normal. However, the blue color filter has lower translucence so the consequence is that you will get a lower brightness.

# Troubleshooting

Start your trouble shooting with the following actions

## Possible power problem

- Make sure power is connected. If you switch the monitor off and then back on, the diode on the front should show green light. Some models have a main power switch next to the power inlet check that this is set to on. If you have a model **without power** adapter and still the no green light it's not a power problem.
- If **not**, check your power connection to the 12V/24V adapter and to the wall. There is a similar diode on the 12V/24V adapter that should show green light.
  - If **not**, the adapter might be broken. If you have another adapter of the same type you can verify by using that adapter.
  - If **yes**, there is a problem with the panel which should be repaired
- If **yes**, then it is not a power problem

## Possible signal problem

- If picture is not stable or not shown at all or you get "No Sync" then check connection of the signal cable and graphic board settings.
- If cable connections and graphic board settings are OK, then try the following
  - Switch monitor off. Wait 10 seconds and switch it back on
  - Re-boot the PC
  - Test monitor by connecting it to another PC
- If nothing of this helps, then there is something wrong with the monitor and it should be repaired. Contact your local reseller for assistance.

## Monitor shows incorrect resolution

If during boot-up of the PC or coming back from sleep-mode the monitors shows an incorrect resolution then this problem can be resolved by

- Remove monitor power cord from the wall outlet
- Wait 15 seconds
- Re-insert the power cord into the wall outlet

# Reference

## **Barten curve**

Curve used to emphasize areas of a digital grayscale where the human eye have trouble discerning similar shades of gray, named after its creator Dr. Peter G.J. Barten.

## **DDC \*1**

This unit conforms with DDC-2B and VESA \*2 standards.

The DDC function reads information stored in the monitor about its capabilities. It communicates over the 15-pin D-sub connector and the 24-pin DVI-D connector and it takes place during start-up of Windows®. It sets the detailed information of the color LCD display in the system file in order to achieve Plug & Play.

The video cable must be connected for reading of the information to take place.

*\*1 DDC (Display Data channel) and \*2 VESA are registered trademarks of Video Electronics Standards Association.*

## **DICOM (Digital Imaging and Communications in Medicine)**

DICOM is a standard for handling, storing, printing, and transmitting information in medical imaging, Part 14 refers to the chapter: "Grayscale Standard Display Function".

## **Kensington Anti-Theft Security Lock Slot**

The LCD monitor is equipped with a security lock slot compatible to Kensington® security lock type. The security cable lock maybe available thru your dealer or it can be purchased at most computer peripheral stores near you.

## **Power management**

This unit conforms to the DPMS standard (Display Power Management Signaling).



## Contact

Olorin AB  
Marios gata 11  
SE 434 37 Kungsbacka  
Sweden

Phone: +46 (0)300 566 780  
Fax: +46 (0)300 566 789

E-mail: [info@olorin.com](mailto:info@olorin.com)

[www.olorin.com](http://www.olorin.com)

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