

# **User Manual**

## **19 inch LCD Monitor for Medical**

**HL1928M-L/R**

**Ver. A0**

### **Change History**

Version	Date	Author	Modification
A0 Review	March 1, 2012	Xu Hongjie	Preliminary Release

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# 1. Application

This high-resolution color display is specifically designed to meet the rigorous performance standards needed for diagnostic, interventional radiology, and other medical applications. To guarantee image integrity, features include accurate signal conversion and a wide range of interfacing options.

**Compact design** -Low weight and small size with improved performance make the monochrome flat panel display HL1928M preferable to conventional CRT monitors.

**Embedded LUT**(Look Up Table )-This monitor is factory calibrated to achieve DICOM part 3.14 compliance and Linear gray level reproduction at the factory set point. Five different settings are stored within the display.

**Screen resolution**- HL1928M is equipped with a panel with Super In Plane Switching technology. The optimal picture resolution is 1280 x 1024 pixels. Video signals with other resolutions typical to medical engineering are optimally zoomed in or out to the screen size.

**Fast backlight stability**- The luminance stabilization circuit employs a built in photo sensor to keep the back-light lamps at a constant luminance for consistent calibration over the life of the display and can control the back light system automatically to extend the life of the monitor and achieve very short warming up time.

**Multi-interface for video inputs**- Support DVI-D,DVI-A,BNC (combined with optional BNC cable) video inputs.

**Digital control interface**-The monitor has an asynchronous RS-232 architecture interface for remote control, such as Brightness, Contrast etc. The protocol of RS-232 is compatible with GE OEC 16 inch CRT monitor.

**Left and Right Monitor**-The monitor can be supported in pairs. The left monitor has protective glass in the front and the right monitor has infrared touch screen in the front.

**Remark** -All relate to the touch screen only applies to HL1928M-R.

## 2. Declarations

### Safety precautions

#### **Medical Equipment**

**With respect to electric shock, Fire and mechanical hazards only in accordance with UL 60601-1 and CAN/CSA C22.2 No. 601.1**

**WARNING:**

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

APPLIANCE COUPLER or separable plug of is used as isolation means to isolate the equipment from mains supply.

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC/EN standards (e.g. IEC/EN 950 for data processing equipment and IEC/EN 60601-1 for medical equipment ).

Furthermore all configurations shall comply with the valid version of the system standard IEC/EN 60601-1-1. Everybody who connects additional equipment to the signal input connector or signal output connector configures medical system, and is therefore responsible that the system complies with the requirements of the valid version of the system standard IEC/EN 60601-1-1. If in doubt, consult our technical service department or your local distributor.

#### **Regular maintenance and calibration are recommended**

Please note that liquid crystal displays such as the HL1928M do not have a failure rate of zero and image parameters may change over time (e.g. luminance or discoloration). Please ensure that all measures are taken to prevent injuries or incorrect diagnoses. Regular maintenance and calibration are recommended.

Correct and safe operation of the flat panel displays is dependent on proper transport, storage, installation and assembly, as well as careful operation and maintenance. The units must only be used for applications for which monitors are normally used. The information in the Section "Technical data" must be observed exactly.

For the sake of safety, the following precautions must be observed:



**Danger: There is a danger to life if the warning information is not observed. Severe personal injury or damage to property may occur.**

**Do not open the unit yourself.**

Certain components inside the units are at high-voltage, i.e. touching these components presents a **danger to life!**

**Only use a perfect power supply cable**

A damaged power supply cable may result in a fire or electric shock. When disconnecting the power supply cable, always do so by holding the plug.

**Only use the same type of fuse**

**T2A/250V**

**Do not insert any objects into the housing**

Objects inserted into the housing may result in damage to the unit or personal injury.

**Do not place any objects on top of the units**

Penetrating liquids may result in a fire or electric shock.

**Connection**

No contact to a patient must occur when handling the cables.

To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth.

**Do not hurt yourself, when moving the display**

The display can be tilted backwards and forwards. Please, pay attention not to hurt yourself, when moving the display. Fingers or small objects may get stuck at the bottom of the display.

When moving the display up and down (height adjustment), make sure you do not squeeze your hand or any other object. The minimum distance between the display edge and the bottom is only 59 mm.

**Caution**

**Incorrect installation may result in extensive damage to property.**

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## **Installation should be carried out by trained personnel**

When installing your medical electrical system with our products in an environment with patients, please observe the safety requirements of EN 60601-1-1 (IEC 601-1-1) for "Specifications for the safety of medical electrical systems" in order to prevent injury to patients and users of your systems. For certain applications, the video earth can be separately connected to the PE via the additional PE connection in the plug panel (observe IEC 601-1-1).

Take appropriate measures to particularly ensure that discharge currents remain below the required limits: Appropriate measures:

- Disconnecting devices for signal input or output unit
- Use of a safety transformer
- Use of additional PE conductor

Only use the signal cables and interface cables specified by the manufacturer for the installation.

Use power cables with a PE contact. Only insert into sockets with a PE contact.

For certain applications, the video earth can be separately connected to the PE via the additional PE connection in the plug panel (observe IEC 601-1-1).

Close the plug panel using the provided cover , and secure using the screws.

**Mounting information:** The stability of the display must be guaranteed following mounting of the foot/holder. The immersion depth of the mounting screws has to be 10 to 12 mm including a 3 mm VESA mounting plate. (See also table "Mounting screws" on the following). All these requirements are satisfied when using the original foot. All requirements must be observed when using customer-specific mounting solutions.

**Notice for users:** The plug panel closed by the cover, must not be opened by users.

**Servicing information:** If housing components have to be removed for servicing, this must not be carried out in the presence of patients, the user, or other persons not involved with servicing.

The following applies to installations in the USA and Canada: Molded power supply plugs must comply with the requirements for "Hospital Grade Attachments" UL 498.

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**Failure to observe the warnings may result in substantial damage to property.**

### **Provide sufficient heat dissipation**

Holes are provided at the rear of the housing. The display must be placed or secured on a hard, level surface at least 10cm from the wall and 15cm away from other devices. Several displays can be butt-mounted horizontally and vertically.

The following must be observed when mounting (VESA connection):

<b>Mounting screws</b>	
Number	4
Thread	M4
Strength	12
Immersion depth	Min. 10 mm; Max. 12 mm
Torque	Max. 3 Nm

The permissible ambient temperature range (5 °C ... 40 °C) must not be violated. Do not subject device to unnecessary shocks. Take care when transporting! **Use the original packaging!** The panel in particular should be protected against shocks.

When touching the panel surface, the mechanical contact or an electrical discharge may cause a brief disturbance in the picture quality.

### **Care of unit / cleaning agents**

- The front panel is extremely sensitive to mechanical damage. Avoid all scratches, knocks etc.!
- Remove water drops immediately; extended contact with water discolors the surface.

Clean the front panel when dirty, using a micro fiber cloth and, if necessary, a glass cleaning agent. Only clean housing parts using a cleaning agent for plastics.

● **Note:**

**Do not use cleaning agents containing solvent, e.g. petroleum spirit!**

### Explanation of the symbols



Attention: Consult the accompanying documents



Alternation current (AC)



Protective earth



Danger, high voltage



Dispose of in accordance to your countries requirements



Dispose of in accordance to your countries requirements



China Rohs symbol



European conformity



China Compulsory Certification



TUV approval mark

### Environmental Requirements

#### Mercury

The Cold Cathode Fluorescent Lamp (CCFL) utilized as the light source for LCD displays, The CCFL is a low-pressure discharge lamp. Construction of the lamp uses a glass tube coated on the inside with an inorganic phosphor. The sealed lamp's envelope contains a mixture of mercury; Mercury damages the

nervous system and is toxic in high doses.

## Lamp Disposal



Lamp(s) inside this product contains mercury and must be recycled or disposed of according to state, local or federal law. For more information, Contact the electronic industries alliance at [www.Elae.org](http://www.Elae.org). For lamp specific disposal information check [www.lamprecycle.org](http://www.lamprecycle.org).

## 3. Installation

### Provide adequate ventilation

Ventilation slots are located on the rear of the housing.

### Ambient temperature

The permissible ambient temperature range must not be violated.

### Minimize reflections

The display should be positioned so that reflections of lights, windows, furniture with shiny surfaces or light-colored walls do not appear on the screen.

### Minimize mirroring

In order to reduce mirroring on the unit, ceiling lighting or reflected light (no dazzling) should be used. Mirroring can only be eliminated if the screen is clean and free of grease. Clean the display using a suitable micro fiber cloth.

### Change of environment

If the unit is brought into a warm environment from a cold one, water may condense upon it. The unit should not be switched on until all the condensed water has evaporated, including that inside the unit. This may take several hours, depending on the conditions.

## 4. Start-up



### Caution

In order to ensure safe operation of the equipment, close attention must be paid to the information contained in this Instruction Manual as well as the warnings in Section 2 "Safety precautions".

## **Caution Information for end customer**

None of the settings must be changed on site by the user, otherwise the guarantee is canceled. This also applies to settings made using the HL1928 M keys. These are therefore locked for certain applications. If settings have to be changed, please contact the responsible servicing department.

The display is designed for individual connection to a graphics card with a power supply of 100 or 240 Volt (TN-S system with PE conductor). If the display is to be used in a sequence of several displays, or if it is not exactly known whether the graphics card standard can be output by the display, refer to Section 5.1 "Connection of the flat panel display".

In order to start the unit properly, the following steps should be carried out in the given sequence.

### **4.1 Connecting the power and signal cables**



#### **Caution**

Use a power cable with PE conductor corresponding to the safety requirements of the respective country of use. Note for North America: Molded power supply plugs must comply with the requirements for hospitals with respect to CSA Std. C22.2 No. 21 and UL 498. The power supply and signal connections are located on the rear of the monochrome flat panel display.

#### **Note**

Note that the cables are not positioned when you receive the display (power cable and BNC cable). The following steps are only necessary if you need to connect/disconnect the cables of the scope of supply.

#### **4.1.1 Little cover (removing)**

Remove the one screws with a M4 Slot screwdriver (one turn suffices). Open the little cover and remove it



#### 4.1.2 Cable (attaching)

Connect the cables to the display.



VGA connector: the flat panel display can be connected to the computer system using a VGA Cable. The display is adapted using an OSD menu.

BNC connector: the flat panel display can be connected to the video camera using a BNC Cable . The display is adapted using an OSD menu.

DVI connection: The connection to the computer can also be made via the digital single link. The picture quality, noise immunity and radiated interference of the complete system depend on the cable quality and length.

DIN6 connection: you can connect the display via the DIN6 connector to the computer for firmware updating.

Serial connection: you can connect the touch screen via the Serial connector to the computer to control the touch screen.

### 4.1.3 Little cover (attaching)



Lead the monitor end of the cables through the little cover's cable duct.

Connect the little cover to the rear cover.

## 4.2 Power up the display

Power up the display and the operation LED lights up (color: green, provided the timing has been recognized – please refer to section 7 "Fault diagnostics").

## 4.3 Adjusting the image geometry

The display automatically recognizes the used standard, and set-up values for each standard are preprogrammed. However, depending on the graphics card used, it may still be necessary to align and size the picture for the selected standard (see Section 6.1 "Picture adjustment"). Normally auto adjust will work.

## 4.4 Adjusting the brightness and contrast

The brightness and contrast must be adjusted for the respective graphics card (different output levels) in the system on site.

### Note on adjustment

- Use the SMPTE test pattern.
- Adjust the brightness so that image sections with 5% and 0% blackness still visibly contrast from one another.

- Adjust the contrast so that image sections with 95% and 100% whiteness still visibly contrast from one another. To adapt the luminosity to the ambient lighting, adjust the backlight brightness (note: 500 cd/m<sup>2</sup> factory setting is then modified).

## 4.5 Screen saver



A screen saver function should be used in order to reduce "image sticking" which can occur in TFT displays.

It is high risk to display a static graphic over half an hour.

Image sticking is the effect where a faint image of the previous screen contents can still be seen after the display contents have changed. By using a screen saver with permanently changing screen contents, unnecessary effects of the same image are avoided.

If the keyboard is locked, contact the servicing department in order to unlock it. The guarantee is cancelled if you unlock it yourself!

# 5. Connections

## 5.1 Connecting the flat panel display

### Note

All screening precautions contained in the corresponding EMC guidelines must be observed. If these guidelines are not observed, interference signals could penetrate the monitor.

### Information on cable installation

Only screened cables are permitted for the signal connections.

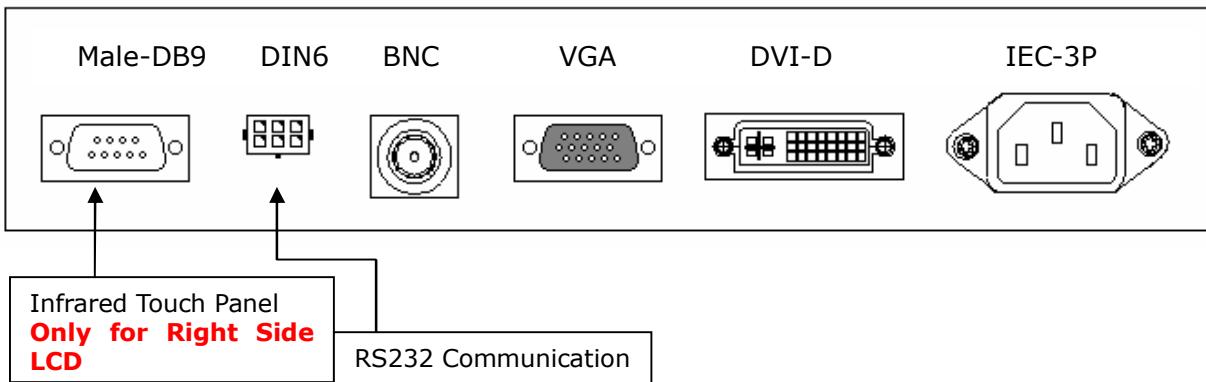
All connectors should be of screw or locking types (as far as possible).

Signal and power cables must not be routed in the same duct.

The display must not share a power supply with motors or valves (glitches!).

## 5.2 Connection panel

A connection panel for the signals and power supply is located at the rear of the flat panel display underneath the little cover.



## 5.3 Information on additional serial interface (Service Only)

DIN6 connection: you can connect the display via the DIN6 connector to the computer for firmware updating and monitor test.

## 5.4 Analog and digital inputs (DVI, VGA, BNC)

### DVI socket

With DVI digital signal through DVI cable.

### VGA socket

With VGA cable for VGA input.

### BNC connector

Use BNC cable (optional) for BNC input.



## 5.5 Power supply connection



### Note

Device fuses can not be exchanged outside of the repair centers.

The display power supply is connected using an appliance plug. Only use the power cable supplied in the delivery, or a cable with PE conductor and appliance socket to DIN 49 547, IEC 320.

## **Caution**

A power cable with PE conductor must be used which corresponds to the safety requirements of the respective country of use.

## **5.6 Serial interface**



## **Caution**

No other units may be connected to the service socket. Connection or disconnection of a unit may only be carried out by servicing personnel or those trained by them. A Serial Spot Meter or Universal Serial Luminance Meter must not be connected in the presence of patients.

The display has a serial RS 232 DIN6 interface sockets to update the SW.

# **6. Adjustments**

## **6.1 Picture adjustment**

This section describes the settings for operation of the flat panel display with a video source. The most important settings are:

### **Adjusting the graphics memory of the video source**

As with all monitors, the flat panel display also has certain limits, e.g. maximum resolution and vertical frequency. The graphics adapter must be set when using the flat panel display such that the limits are observed.

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## Fine adjustment of the flat panel display

### Note

Fine adjustment of the flat panel display can only be carried out via the analog port. The digital input (DVI-D,) does not require a fine adjustment since the display signal is always optimum.

RGB picture sources via VGA connector supply analog signals which are basically intended for conventional CRT monitors and which are processed directly by them.

In contrast, the analog signals must be converted for a flat panel display into digital signals by a video digitizer. Depending on the picture source, cable length and video mode (e.g. VGA, SVGA, XGA) this conversion may cause certain deviations which cannot be corrected fully automatically by the flat panel display. A manual fine adjustment is therefore necessary during which the flat panel display (or, more precisely, the video digitizer) is matched to the respective video source. The fine adjustment comprises e.g. setting the horizontal/vertical picture position and the picture sharpness. This can be carried out for the flat panel display HL1928M using an OSD menu.

To optimize the display settings for the installed graphic board, and to ensure all gray levels are distinguishable, we recommend to adjust the brightness and contrast levels for and only for analog inputs. Note that the calibration (in the Look Up Table) is not changed by these adjustments (All the monitors are and remain factory calibrated):

Using a 100% black picture and an appropriate measurement device (a spot meter recommended), decrease the brightness level using the OSD controls until the measurement device displays a constant level (i.e. the measured value no longer changes). Once this is achieved, increase the brightness level slightly until the display is just above the absolute lowest black level (one step is generally sufficient).

Similarly, set the white level using a 100%-white test pattern and the measurement device. Only the contrast level should be adjusted to ensure that the black level remains unchanged.

Control again the black value did not change. In case it did you need to duplicate the two previous steps until it does not change anymore (cause: pedestal).

Increase the contrast level until the measurement device no longer detects an increase in luminance. Once this is achieved, decrease the contrast level

slightly (1 or 2 steps is generally sufficient).

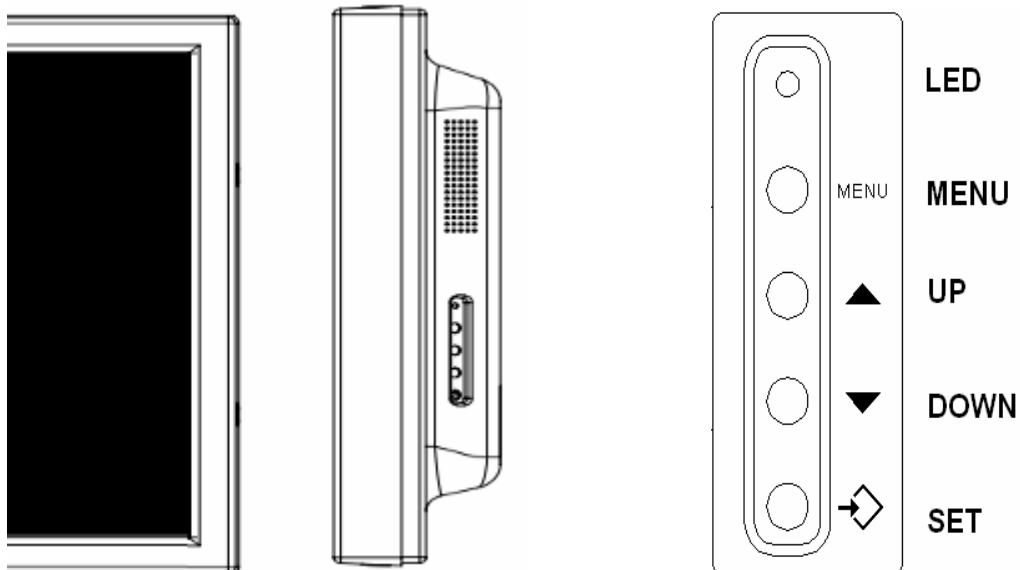
At this point, the display is configured for optimal performance with the installed graphic board. If one is not yet satisfied with the luminance level, the black and white levels can be further increased by adjusting the backlight level in the OSD menu. Please note that higher backlight level settings tend to reduce the stability of luminance over time.

## 6.2 Optimum picture quality

In order to achieve an optimum picture quality, the color flat panel display HL1928M should be operated with a graphics resolution of 1280 x 1024 pixels (settings for graphics card in the PC). When adjusting the picture position and size, ensure that the picture appears exactly on the active surface of the display and that it is not offset by even one pixel. For example, if the horizontal position is offset by one step to the right, the right-hand edge of the picture will disappear, and a black pixel column will appear at the left-hand edge. And similarly for an offset to the left, top or bottom. If the vertical lines are still slightly fuzzy, adjust the setting "Frequency/phase" (see Section 6.4 "Description of the menus"). 6.3 OSD menu

## 6.3 OSD Menu

### 6.3.1 Keys assignment and operation LED



A "dynamic help for keypad function" is available for each menu: it explains the

role of each key depending on the OSD menu window, which is currently active.

### 6.3.2 Key Functions without active OSD Menu

Key	Action
Menu	Activate OSD

### 6.3.3 Key Functions in the OSD Menu

Keys	Situation	Action
Menu	Always	Jump to next line
Up	Slide controller	Increase Value
	Command	“Enter Key”
Down	Slide controller	Decrease value
SET	Always	Exit current menu (Settings are retained)

### 6.3.4 Submenu Calls

Press the “Menu” key while the OSD is active, the function icon will jump to next line. Pressing the “Up” key, the coordinate submenu will be selected.

### 6.3.5 Locking of OSD Menu

Keys	Action
1 time SET key 2 times UP key within 3 second	Lock or unlock OSD

### 6.3.6 Description of OSD Menu

#### OPERATION

Main Menu	Function	Adjustment range	Description



Image	Brightness	0...255	Adjustment brightness of LCD backlight to adapt total brightness for room illumination.
	Contrast	0...255 (Default=128)	Adjustment of contrast This allows the brighter area to be seen more distinctly. The center point is in 128 position.
	Black level	0...255 (Default=128)	It is used to adjust the black level of the monitor. The center point is in 128 position. This allows the darker area to be seen more distinctly.
	Sharpness	0...48 (Default=5)	One of the 48 filters can be selected for the focus setting to reduce scaling artifacts. Interpolation filters depend on the input resolution.
	Reset		While choose Reset state it will recall factory default. Brightness, Contrast, Backlight setting, sharpness, gamma etc.

