

Radiance® Ultra

with optional ZeroWire Embedded Wireless Technology



USER MANUAL

ENGLISH

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Safety Information

Warnings and Cautions



This symbol alerts the user that important information regarding the installation and/or operation of this equipment follows. Information preceded by this symbol should be read carefully in order to avoid damage to the equipment.



This symbol warns the user that un-insulated voltage within the unit may have sufficient magnitude to cause electrical shock. It is dangerous to make contact with any part inside the unit. To reduce the risk of electric shock, DO NOT remove cover (or back).

NOTE: There are no user serviceable parts inside. Refer servicing to qualified service personnel.



This symbol cautions the user that important information regarding the operation and/or maintenance of this equipment has been included. Information preceded by this symbol should be read carefully to avoid damage to the equipment.



This symbol denotes the manufacturer.



This symbol denotes the manufacturer's European Community representative.

To prevent fire or shock hazards, do not expose this unit to rain or moisture. Also, do not use this unit's polarized plug with an extension cord receptacle or other outlets unless the prongs can be fully inserted. The product is designed to meet the medical safety requirements for a patient vicinity device.

This product is a Class I medical device according to M.D.D. in Europe. No modifications are allowed.

This equipment/system is intended for use by healthcare professionals only.

This product is intended for continuous operation.



Safety Compliance

This product is T.U.V. approved with respect to electric shock, fire and mechanical hazards only in accordance with CAN/CSA C22.2 No. 60601-1 and ANSI/AAMI ES60601-1.



Safety Compliance

This device meets the requirements of EN60601-1 so as to conform to the Medical Device Directive 93/42/EEC and 2007/47/EC (general safety information).

This product complies to the above standards only when used with the supplied medical grade power supply:

Model	Radiance Ultra
Power Supply	BridgePower BPM150S24F06
AC Input	100 - 240V, 50 - 60 Hz
DC Output	24V, 6.25A

Power Cord

Use a hospital grade power cord with the correct plug for your power source.

Disconnect the power cord from the AC mains. The power cord is the only recognized disconnect device.

MEDICAL EQUIPMENT should be positioned so that the disconnect device is readily accessible.

Monitors should be powered from a center tapped circuit when used in the US at voltages over 120 volts.

Grounding

This product is energized from an external electrical power source for Class 1 equipment. It is the responsibility of the installer to test the product's earth ground to verify that it complies with the hospital, local and national impedance requirements.

A ground post is located on the back of the product to use for grounding the chassis of the unit. Any such ground must be installed in accordance with applicable electrical codes. The ground post is shown in the mechanical drawing found on page 21.

Recycling



Follow local governing ordinances and recycling plans regarding the recycling or disposal of this equipment.

Intended Use and Contraindications

Note: If your display is configured with embedded ZeroWire, please refer to the ZeroWire “Intended Use and Contraindications” statement on page 25.

Intended Use

Radiance Ultra series monitors are intended for use in a medical environment to display high quality video and graphic images.

Contraindications

1. Do not use this product in the presence of flammable anesthetics mixture with air, oxygen or nitrous oxide.
2. No part of this product may come in contact with a patient. Never touch the product and a patient at the same time.
3. This product is capable of displaying Radiology (PACS) images for reference, not diagnostic, purposes only.
4. For mission critical applications, we strongly recommend that a replacement unit be immediately available.

Image Retention Notice



Warning: Leaving a fixed (constant) image on the monitor for a long period of time can result in image retention. Avoid leaving a fixed image on the monitor, or turn the monitor off when it is not in use.

Terms and Conditions

Declarations of Conformity

FCC and Council Directives of European Standards

This device complies with Part 15 of FCC rules and 93/42/EEC and 2007/47/EC of the Council Directives of European Standards. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable results.

1. Use the attached specified cables with the color monitor so as not to interfere with radio and television reception. Use of other cable and adapters may cause interference with other electronic equipment.
2. This equipment has been tested and found to comply with the limits pursuant to FCC part 15 and CISPR 11. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

IEC

This equipment has been tested and found to comply with the limits for medical devices to the IEC 60601-1-2. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to other devices in the vicinity.

FCC, Council Directives of European Standards, and IEC

There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult your dealer or an experienced radio/TV technician for help.

Accessory equipment connected to this product must be certified according to the respective IEC Standards (i.e., IEC 60950-1) for data processing equipment and IEC 60601-1 for medical equipment. Furthermore, all configurations shall comply with the system standard, IEC 60601-1-1. Anyone who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of system standard IEC 60601-1-1. Whoever is responsible for securing the unit to a system needs to insure that the mounting equipment used with this product complies to IEC standard 60601-1. If in doubt, consult the technical services department or your local representative.

Legal Statement

NDS may sell its products through other medical device manufacturers, distributors and resellers and therefore, purchasers of this NDS product should consult with the entity through which this product was originally purchased regarding the terms of any applicable product warranties provided by such entity, if any.

NDS neither assumes nor authorizes any person to assume for it any other liabilities in conjunction with and/or related to the sale and/or use of its products. To ensure proper use, handling and care of NDS products, customers should consult the product specific literature, instruction manual, and/or labeling included with the product or otherwise available.

Customers are cautioned that system configuration, software, the application, customer data and operator control of the system, among other factors, affect the product's performance. While NDS products are considered to be compatible with many systems, specific functional implementation by customers may vary. Therefore, suitability of a product for a specific purpose or application must be determined by the consumer and is not warranted by NDS.

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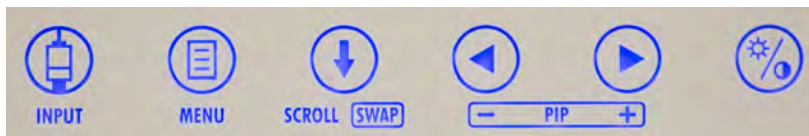
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Display User Interface

Display Keypad

The Display Keypad is centered on the lower front surface of the display enclosure, providing controls for adjustment of display parameters using the On Screen Display (OSD) Menu system.



Menu Navigation

MENU Buttons: Open the OSD Menus



To open the Input Menu (see page 2), tap the **INPUT** button twice. To open the Display Menu (see page 3), tap the **MENU** button once.

SCROLL Button: Vertical Selection Control



To enter a menu and begin a parameter selection process, tap the **SCROLL** button. The top parameter row is selected with the first tap, and the selection moves downward to the next row with each successive tap.

To exit a menu, use the **SCROLL** button to move the selection to the bottom menu row, and then press the **SCROLL** button just once to highlight the menu tab, where you can use the ◀ or ▶ buttons to select another menu tab.

Left/Right Buttons: Horizontal Selection Controls



To adjust a parameter, select the parameter row using the **SCROLL** button, then tap the ◀ or ▶ buttons to make the adjustment or to select a setting.

QUICK SELECT: Primary Input Selection



To display the QUICK SELECT menu, tap the **INPUT** button.

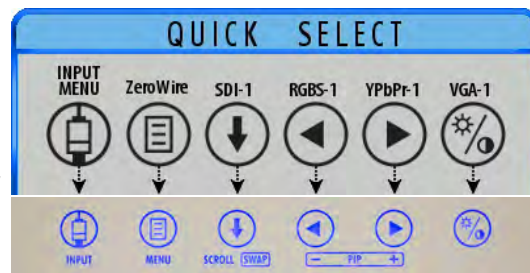
The QUICK SELECT menu allows the user to select any active input as Primary with a single tap on the Keypad button under the QUICK SELECT icon labeled with the target input.

QUICK SELECT icons designating active inputs are tinted light blue.

QUICK SELECT options apply only to selection of a Primary input. If an input selected as Primary is in current use by a Secondary input being displayed as PIP, the PIP image will clear and display as a Full Screen Primary image.

The QUICK SELECT menu closes 30 seconds after the last selection is made.

The QUICK SELECT menu can be customized to display inputs not included in the default listing using the EDIT QUICK SELECT menu.



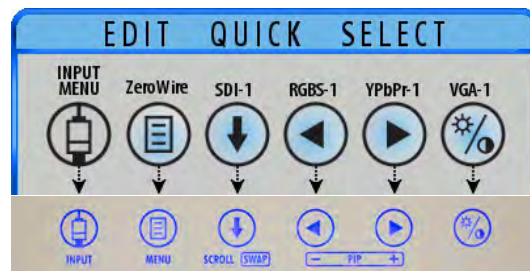
EDIT QUICK SELECT: Modify Availability of Primary Inputs



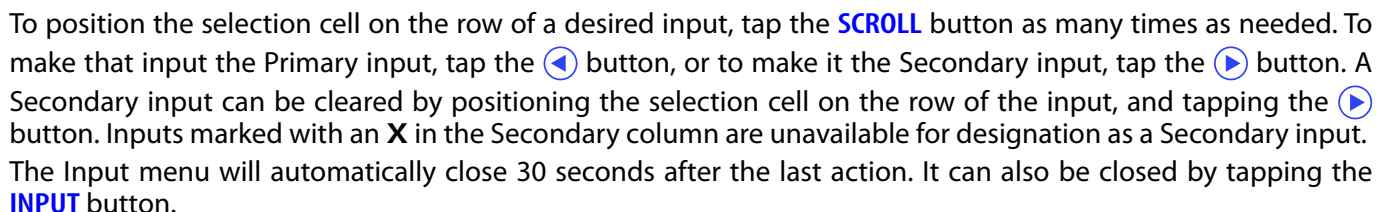
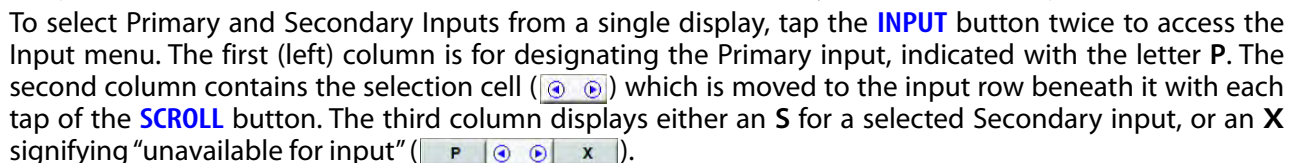
To display the EDIT QUICK SELECT menu, press and hold the **INPUT** button for three seconds.

To change a QUICK SELECT button assignment, tap the Keypad button under the EDIT QUICK SELECT icon that is labeled with the input assignment you want to change.

Each tap of the Keypad button displays in descending order the next input as listed in the Input Menu. Tap the button until the desired input appears. All buttons except the INPUT MENU button are available for reassignment.



The Primary image is designated by selection of a Primary input. If a Secondary input is selected, the Primary image will share the screen display with a Secondary image that is presented in configurations ranging from small to large Picture-In-Picture (PIP) to equal halves of Split-Screen displays, as shown on page 12.



The following table shows which inputs may be selected as Secondary relative to inputs selected as Primary. Inputs marked with a ✓ in the Secondary columns can be designated as the Secondary input. Gray cells denote inputs sharing a common connector or electronics that cannot be used simultaneously.

DVI-1, VGA-1, RGBS-1, YPbPr-1 and SOG-1 share the same connector. If one is selected as the Primary input, the others cannot be selected as Secondary. The same is true for VGA-2, RGBS-2, YPbPr-2 and SOG-2. Some inputs are not available in some configurations.

2 | Display User Interface

Display Menu



To open the Display Menu, tap the **MENU** button. The ZeroWire Menu displays by default, with details of the current Primary and Secondary inputs listed left and right across the top of the menu above the menu tabs.

To select other menus, tap the **◀** or **▶** buttons to highlight the menu tab, then tap the **SCROLL** button to enter the menu.

To adjust a parameter, press the **SCROLL** button to move the row selection down to it, and then tap the **◀** or **▶** buttons to adjust the parameter or to select a setting. Parameter adjustments are applied in real time while changing values or settings.

The Display Menu automatically closes 30 seconds after the last action. It can also be closed by pressing the **MENU** button.

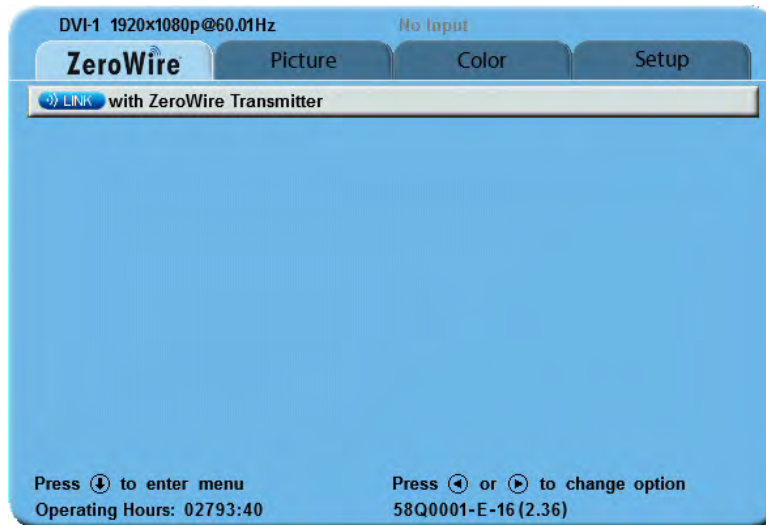
Note: Grayed out descriptions indicate parameters not available for the current signal or input configuration.



ZeroWire Menu

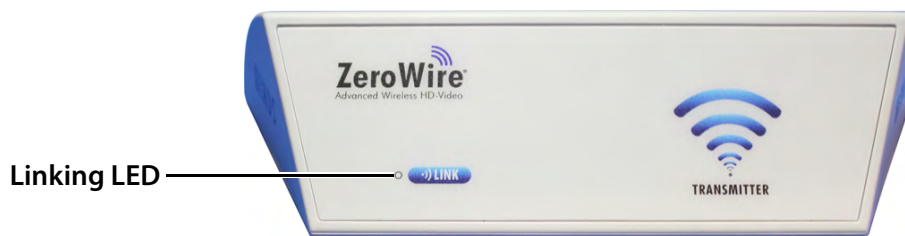
Note: The ZeroWire Menu is enabled only on displays configured with an embedded ZeroWire Receiver.

To enter the menu and activate the ZeroWire linking process, tap the **SCROLL** button.

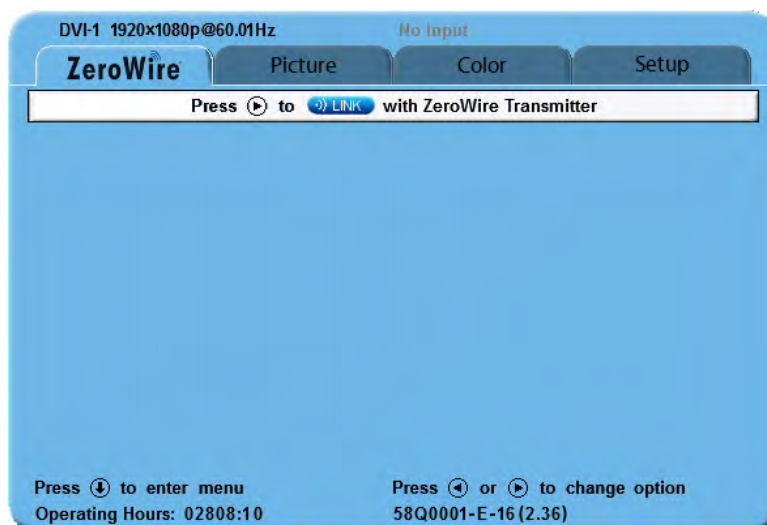


Refer to “ZeroWire Transmitter Setup” on page 28, and confirm that the display-mounted ZeroWire Transmitter is facing the ZeroWire embedded Receiver display at a distance ≤ 8 feet (2.4 meters), and that both displays are aligned vertically and horizontally within $\pm 10^\circ$ at heights ≥ 5 feet (1.5 meters).

At the display-mounted ZeroWire Transmitter, press and hold the **LINK** button until the Linking LED begins flashing.



At the ZeroWire embedded Receiver display, begin the ZeroWire linking process by tapping the  button.

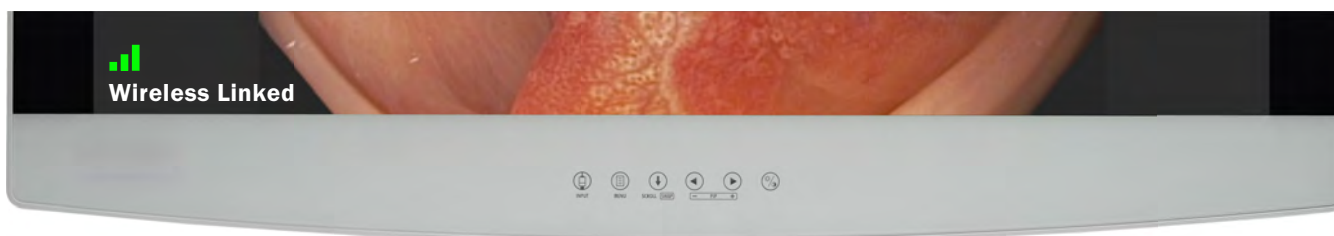
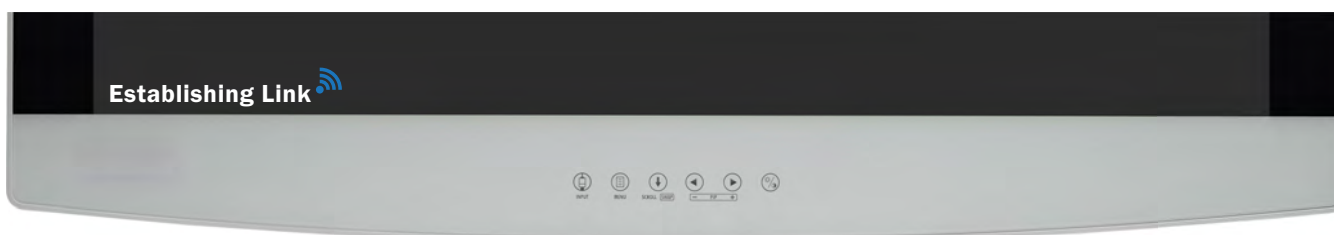
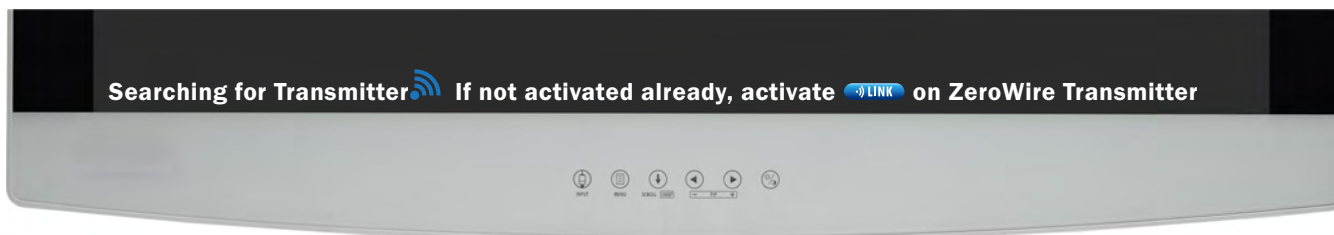


The display of the ZeroWire embedded Receiver unit will go black when the Primary Input is automatically switched to ZeroWire. A series of linking status messages in the lower corner of the display will indicate progressive stages in the linking process. When linking is complete, the Transmitter display image will appear on the Receiver display.

For an alternative ZeroWire linking procedure, see “ZeroWire Quick Start Linking” on page 30.

ZeroWire Receiver Status Messages

ZeroWire status messages indicate stages of the linking process.



Refer to “Wireless Linking Status Messages” on page 31 for complete descriptions of all status messages.

Picture Menu

To access the Picture Menu, tap the  button once after opening the Display Menu.



Picture Menu Parameters

Horizontal Position

To horizontally center the image, tap the  or  buttons.

Vertical Position

To vertically center the image, tap the  or  buttons.

H-Sharpness

To increase sharpness (edge enhancement) of the displayed image in the Horizontal plane, tap the  or  buttons.

V-Sharpness

To increase sharpness (edge enhancement) of the displayed image in the Vertical plane, tap the  or  buttons.

Phase (VGA, RGBS, YPbPr, and SOG only)

To adjust phase of the display pixel clock, tap the  or  buttons.

Frequency (VGA, RGBS, YPbPr, and SOG only)

To adjust frequency of the display pixel clock until the image fills the screen horizontally, first set **Scaling** to **Fill**, and tap the  or  buttons.

Overscan (Video)

Parameter enabled when the input is 16:9, 480P, 576P, or interlaced. Tap the  or  buttons to select.

0: The image is displayed at a size that fills the screen without losing any video information. Image could be displayed as letterboxed, with black bars top and bottom or left and right.

1, 2, 3, 4, 5 or 6: Incrementally enlarges and crops the centered image. As the image becomes larger, video information is lost on all sides.

Scaling (Graphics)

Parameter enabled when input signal is not 16:9, 480P, 576P, or interlaced. Tap the  or  buttons to select.

Fill: Expands the video image to fill the entire screen. The aspect ratio may not be accurately displayed.

Aspect: Expands the video image until its largest dimension fills the screen while retaining the aspect ratio. The image may be displayed as letterboxed, with black bars top and bottom or left and right.

1:1: Displays the video data in its native size and aspect ratio. Image with aspect ratios different from that of the display are letterboxed, with black bars top and bottom or left and right.

SmartSync™/Alternative Modes: (VGA, RGBS, YPbPr, and SOG only)

NDS proprietary SmartSync technology examines incoming signals to automatically display the video image in its proper format.

Alternative Modes are used to manually distinguish between modes whose timing characteristics are very close.

SmartSync: To enable SmartSync, tap the  button.

Alternative Modes: To make an Alternative Modes adjustment, tap the  button. After selecting Alternative Modes, the mode changes incrementally each time the  button is tapped until the selected mode equals the maximum available. The next tap of the  button restores the initial mode.

Flip/Rotate

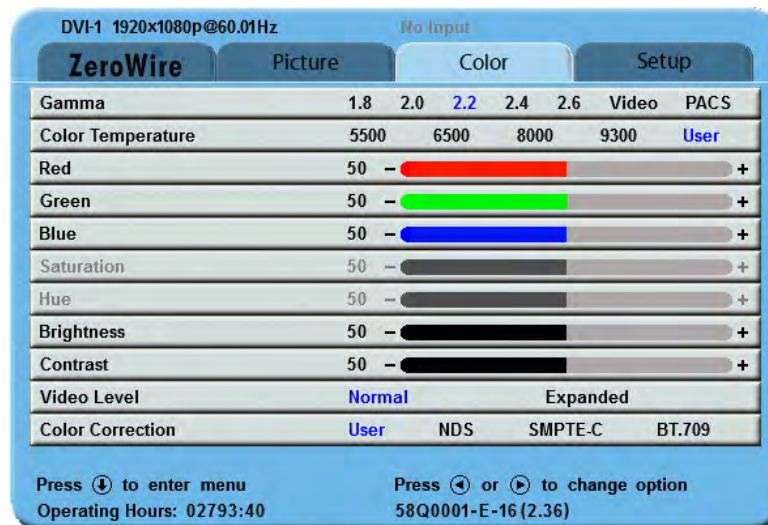
Tap the  or  buttons to select one of 5 options:

H-Flip	V-Flip	90°	180°	270°
Left to right flip	Top to bottom flip	Clockwise rotation	Clockwise rotation	Clockwise rotation

Fine Tune

Currently not available.

Color Menu



Gamma

To select a gamma setting, tap the ◀ or ▶ buttons.

1.8, 2.0, 2.2, 2.4 or 2.6: Preset gamma values

Video: Linear gamma Look Up Table (LUT)

PACS: DICOM gamma LUT

This product is capable of displaying Radiology (PACS) images for reference purposes only.

Color Temperature

To select a preset color temperature, tap the ◀ or ▶ buttons.

5500, 6500, 8000, 9300: Preset color temperatures.

User: If a preset color temperatures is selected, and any other parameter is subsequently changed, the resulting values are copied to the **Color Correction User** presets and **User** is selected.

Red, Green, Blue

To increase or decrease the intensity of the selected color, tap the ◀ or ▶ buttons.

Saturation

To set the saturation (color intensity) of the image, tap the ◀ or ▶ buttons.

Hue

To set the hue (color tint) of the image, tap the ◀ or ▶ buttons.

Brightness

To adjust brightness, tap the ◀ or ▶ buttons. Brightness is also controlled by the ⚙ (Brightness/Contrast) button described on page 13.

Contrast

To adjust contrast, tap the ◀ or ▶ buttons. Contrast is also controlled by the ⚙ (Brightness/Contrast) button described on page 13.

Video Level

To adjust signal range, tap the ◀ or ▶ buttons.

Normal: Provides a dynamic range equivalent to the incoming signal with no change.

Expanded: Expands the signal level such that an input signal with range 16 (black) to 235 (white) will be expanded to a range of 0 (black) to 255 (white).

Note: If a signal is already full range (0 to 255), selecting the Expanded setting will cause the signal to “clip” or “saturate.”

Color Correction

To select a color correction setting, tap the ◀ or ▶ buttons.

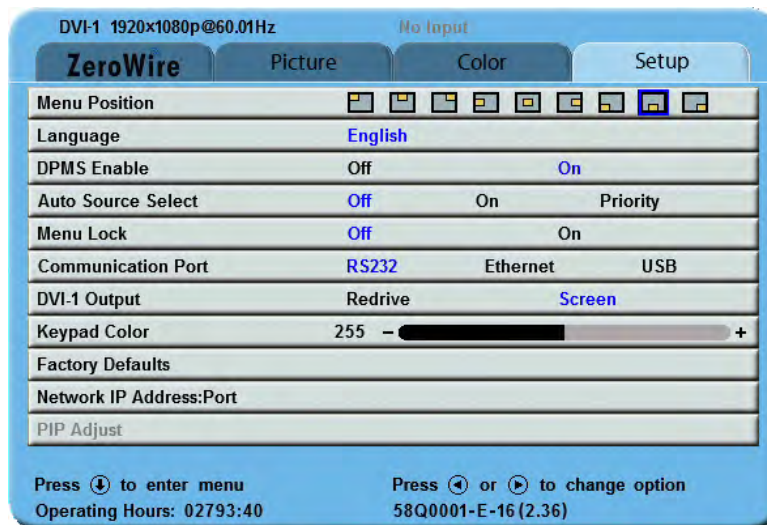
User: Default values replaced by user modified settings.

NDS: Factory calibrated to match NDS specifications of 2.2 gamma/6500K color temperature.

SMPTE-C: Factory calibrated to meet the SMPTE-C standard.

BT-709: Factory calibrated to meet the BT-709 standard.

Setup Menu



Menu Position:

To select from nine preset screen locations for display of the OSD menus, tap the ◀ or ▶ buttons.

Language:

To select one of eight languages: **English, Deutsch, Français, Italiano, Svenska, Español, Nederlands, or Русский**, tap the ◀ or ▶ buttons.

DPMS Enable

To enable or disable Display Power Management System (DPMS), tap the ◀ or ▶ buttons.

Off: Default setting.

On: If there is no input signal, a “D.P.M.S” message displays for 10 - 15 seconds before the display goes into Power Saving mode. The display turns on when the input signal is restored.

Auto Source Select

To disable or enable Auto Source Select, tap the ◀ or ▶ buttons.

Off: Video input is manually selected.

On: Searches through all possible input sources until an active video source is found.

Priority: Priority Input Select is by default disabled. A Secondary input must be selected before Priority Input Select can be enabled. When the Priority Input Select function is enabled, the PIP image is placed behind the Primary image, the PIP + and - (◀ and ▶) buttons are disabled, and the **SWAP** button remains enabled. If the Primary signal is lost, the Secondary input is displayed. If the Primary signal is restored, its image is displayed again, and the Secondary image is placed behind the Primary image. If both the Primary and Secondary signals are lost, the monitor alternately scans the Primary and Secondary inputs until a signal is detected on one of them. When a signal is detected on the Primary or Secondary input, its image is displayed on the monitor.

Menu Lock

To enable Menu Lock, press the ▶ button.

Off: Default setting.

On: Disables access to OSD menus to prevent inadvertent changes to display settings. The OSD closes, and a MENU LOCKED message displays briefly. To unlock OSD access, simultaneously press and hold the **MENU** and **SCROLL** buttons until a MENU UNLOCKED message displays.

Communication Port

To select a Communication Port for control of the display using NDS Unified Serial Commands, tap the ◀ or ▶ buttons. For connector details, see “Data Connectors and Pinouts” on page 18.

RS-232: Connect an RJ-25 cable to the RS-232 port.

Ethernet: When the Ethernet port is selected, the display can be controlled through the TCP/IP port.

Note: When using the Ethernet Communication Port selection, verify the Network IP Address: Port, Subnet Mask and Gateway settings described in “Network IP Address: Port” on page 10 are correctly configured for your network.

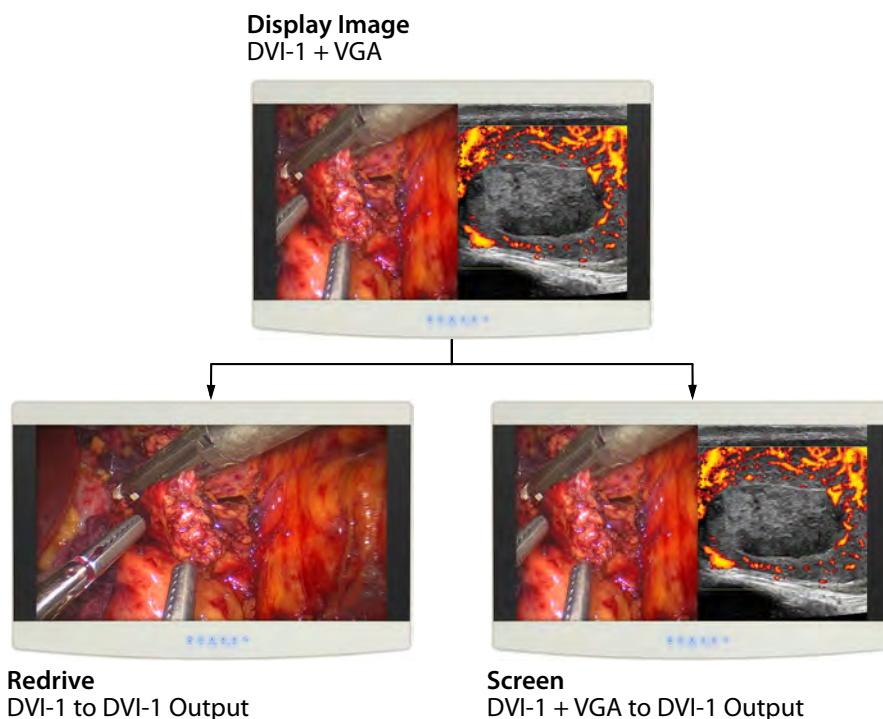
USB: A mini-USB cable used with the USB (ND-OS) port will appear to the connecting device as an RS-232 port.

DVI-1 Output

To change Redrive or Screen settings, tap the  button, which toggles selection between the two settings.

Redrive: Outputs DVI-1 signal input to DVI-1 RE-DRIVE (Output) connector.

Screen: Outputs display image, including PIP and OSD, to the DVI-1 RE-DRIVE (Output) connector.



Keypad Color

To modify the Keypad color setting, tap the  or  buttons.

Factory Defaults

To return all settings to factory preset values, tap the  button to open the Factory Defaults menu.

Factory Defaults	Press  to Enter
Network IP Address:Port	
PIP Adjust	
Press  to enter menu	
Operating Hours: 02826:45	
Press  or  to change option	
58Q0001-E-16 (2.36)	

Next, tap the **SCROLL** button to select the Factory Defaults function, and tap the  button. The “Restoring Factory Defaults” message displays while processing.

Factory Defaults

Network IP Address:Port

PIP Adjust

Operating Hours: 02795:40

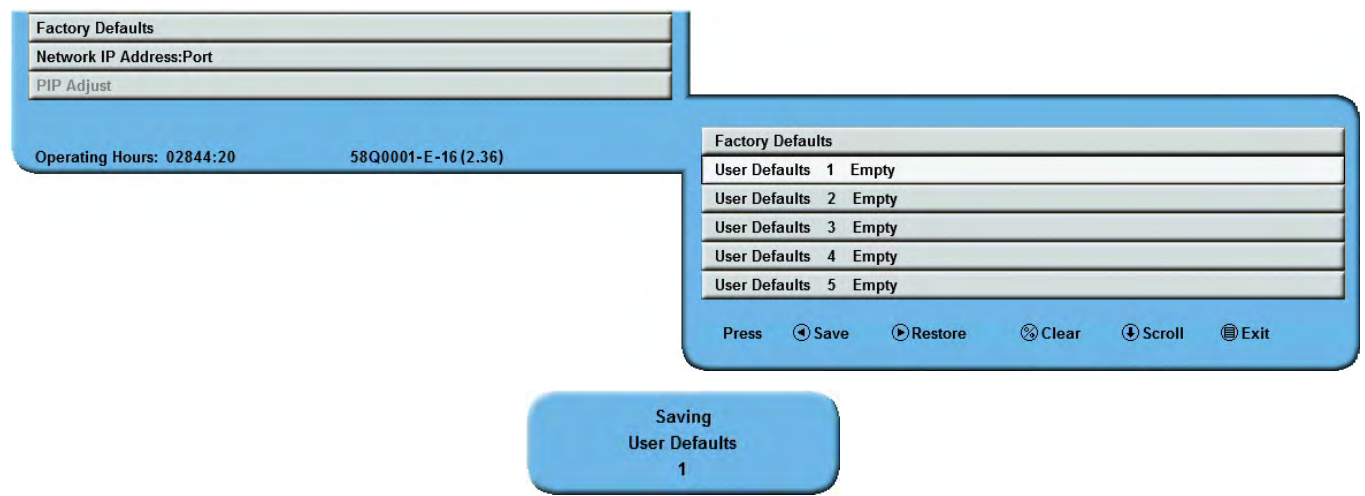
58Q0001-E-16 (2.36)

Factory Defaults	Press  to Select
User Defaults 1	Empty
User Defaults 2	Empty
User Defaults 3	Empty
User Defaults 4	Empty
User Defaults 5	Empty
Press  Scroll 	

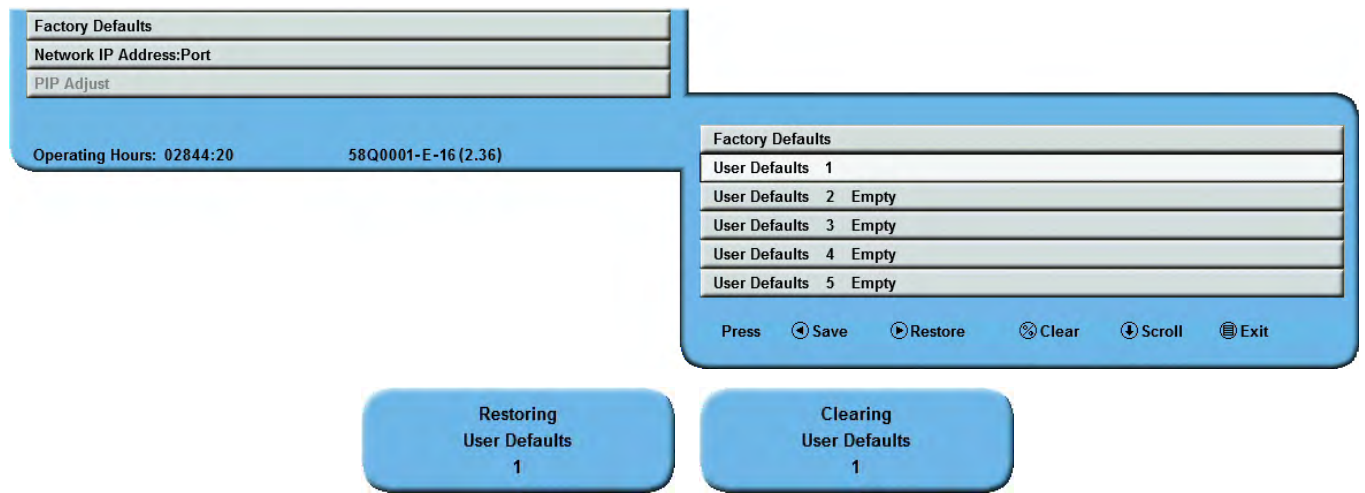
Restoring
Factory Defaults

User Defaults

To save changes to default parameters in a User Default profile, tap the **SCROLL** button to select a User Defaults profile marked “Empty,” and tap the ⏪ button to save the profile. The “Saving User Defaults” message displays while processing.



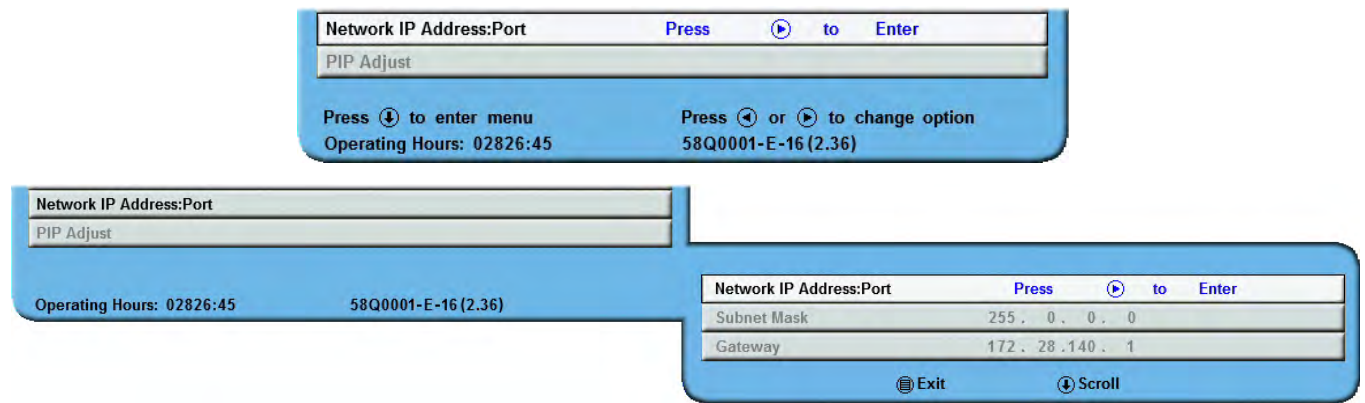
To restore a User Defaults profile after changing other parameters, select the saved User Defaults profile and tap the ⏩ button. The “Restoring User Profile” message displays while processing. To clear a User Defaults profile, select the saved User Defaults profile and tap the ☐ (Brightness/Contrast) button. The “Clearing User Profile” message displays while processing.



Network IP Address: Port

This parameter allows the user to configure the device with static or dynamic IP settings and to configure the Ethernet port for control the display using Unified Serial Commands.

To configure the display for dynamic IP address, tap the ⏩ button to open the Network IP Address menu, tap the **SCROLL** button and then tap the ⏩ button to enter the menu.



To enable the dynamic IP setting, tap the **SCROLL** button until the DHCP (Dynamic Host Configuration Protocol) checkbox is highlighted blue, and then tap either of the ◀ or ▶ buttons to toggle DHCP on or off.

The screenshot shows a network configuration screen. On the left, there's a sidebar with 'Network IP Address:Port' and 'PIP Adjust' options. The main area displays 'Operating Hours: 02849:35' and '58Q0001-E-16 (2.36)'. On the right, a table shows network settings: 'Network IP Address:Port' (127 . 0 . 0 . 1 : 63774), 'Subnet Mask' (255 . 0 . 0 . 0), and 'Gateway' (172 . 28 . 140 . 1). The 'DHCP' checkbox is unchecked. At the bottom right are 'Exit' and 'Scroll' buttons.

Network IP Address:Port	127 . 0 . 0 . 1 : 63774	DHCP : ☐
Subnet Mask	255 . 0 . 0 . 0	
Gateway	172 . 28 . 140 . 1	

With DHCP on, Network IP address, Subnet Mask and Gateway are disabled because they will automatically be configured when the unit is connected to a network supporting automatic setup.

This screenshot is similar to the previous one, but the 'DHCP' checkbox is now checked. The network settings table remains the same, but the fields for IP address, subnet mask, and gateway are likely disabled.

Network IP Address:Port	127 . 0 . 0 . 1 : 63774	DHCP : ☒
Subnet Mask	255 . 0 . 0 . 0	
Gateway	172 . 28 . 140 . 1	

Whether the network is configured with DHCP On or Off, the Port must be set to match the port the commands will be sent on. The Port can be set by tapping the ▶ button to enter edit mode, then tap the **SCROLL** button until the port number is highlighted in blue.

This screenshot shows the port number '63774' in the 'Network IP Address:Port' field highlighted in blue, indicating it is in edit mode. The 'DHCP' checkbox is still unchecked.

Network IP Address:Port	127 . 0 . 0 . 1 : 63774	DHCP : ☐
Subnet Mask	255 . 0 . 0 . 0	
Gateway	172 . 28 . 140 . 1	

Tap the ◀ or ▶ buttons to increase or decrease the port number until the desired port number is set. When DHCP is set to OFF, the user must configure the Network IP address, Subnet Mask and Gateway for the network the display will be controlled from. To set the IP address, make sure to disable DHCP first, then tap the ▶ button to enter edit mode and tap the **SCROLL** button to highlight the first octet (one of the four IP Address digits). Tap the ◀ or ▶ buttons to configure the first octet, then tap the **SCROLL** button to highlight and set each subsequent octet until all four are set correctly.

Consult your IT administrator if you do not know the settings for the network you are connecting to.

Subnet Mask

The Subnet Mask must be set manually when DHCP is disabled.

To set the Subnet Mask, tap the ▶ button to enter edit mode and highlight the first octet (one of the four Subnet Address digits). Tap the ◀ or ▶ buttons to configure the first octet, then tap the **SCROLL** button to highlight and set each subsequent octet until all four are set correctly for your network. When DHCP is enabled, this parameter is automatically configured by the network.

Gateway

The Gateway must be set manually when DHCP is disabled.

To set the Gateway, tap the ▶ button to enter edit mode and highlight the first octet (one of the four Gateway Address digits). Tap the ◀ or ▶ buttons to configure the first octet, then tap the **SCROLL** button to highlight and set each subsequent octet until all four are set correctly for your network. When DHCP is enabled, this parameter is automatically configured by the network.

PIP Adjust

To select a preset PIP display option, tap the ◀ or ▶ buttons. PIP display options are also controlled by keypad PIP controls described on page 12.

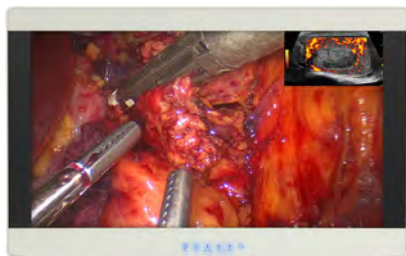
Picture In Picture Controls

PIP: Secondary Image Size Control

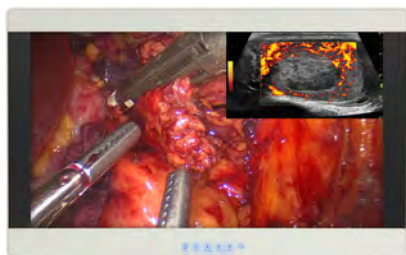


When starting with only a Primary input selected, selecting a Secondary input will first display as a Small PIP image.

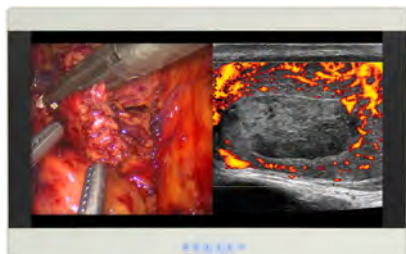
To change the size of a Secondary image, close OSD Menus, and tap the ◀ or ▶ buttons to scroll through the PIP modes described below.



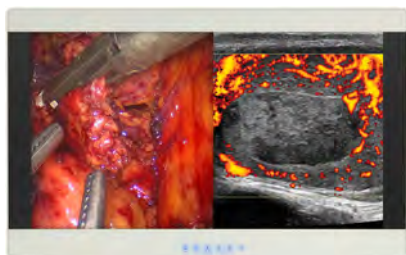
Small PIP: Secondary image is displayed at 25% of total screen width, with Primary image displayed full screen.



Large PIP: Secondary image is displayed at 40% of total screen width, with Primary image displayed full screen.



Split-Screen: Primary and Secondary images are displayed on equal screen halves, with above/below letterboxing.



Split-Screen Overscan: Primary and Secondary images are displayed on equal screen halves with image height maximized and left/right cropping.



Full Screen Primary: Primary image displayed full screen, with Secondary image hidden.

SWAP: Exchange Primary and Secondary Inputs



To swap the Primary input and screen location with that of the Secondary input, tap the ⬇ (SCROLL/SWAP) button. Tap the button again to restore the inputs to their original Primary/Secondary status. It is not necessary for both images to have signal in order to swap Primary and Secondary images.

General Purpose Input/Output

The General Purpose Input/Output (GPIO) control allows the user to step through the Secondary image sizes and swap the Primary and Secondary images as described on page 12, and to display a Record indicator in the upper left corner of the display.

Using a GPIO Control Device

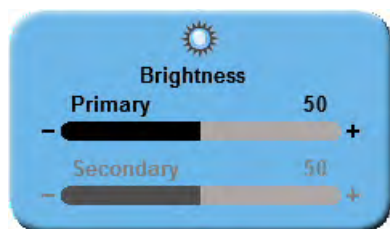
1. Select Primary and Secondary inputs in the Input menu.
2. Connect an appropriately wired device to the GPIO connector on the Primary Board. See GPIO description and pinout diagram on page 20.
3. Press the device PIP Size button to cycle the display through PIP and split-screen display options.
4. Press the device SWAP button to swap the Primary and Secondary image locations.
5. Press the device Record button to display the Record indicator until the Record button is released.

Image Adjustment



Brightness/Contrast Button

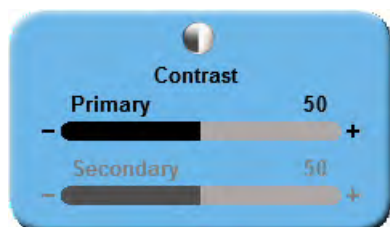
Tap the  (Brightness/Contrast) button once to access the Brightness control. Tap the button twice to access the Contrast control, or tap it three times to access the Backlight control. Tap the  or  buttons to adjust the controls.



Brightness Control

To adjust brightness of the Primary input, tap the  or  buttons. If a Secondary input is enabled, tap the Brightness/Contrast button again to access the Secondary brightness control.

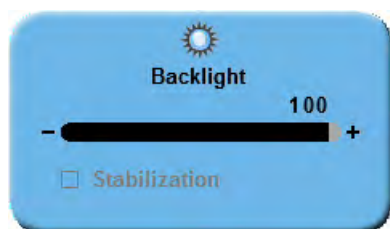
NOTE: Setting brightness too high or too low reduces the range of shadow and highlight detail of the displayed image.



Contrast Control

To adjust contrast of the Primary input, tap the  or  buttons. If a Secondary input is enabled, tap the Brightness/Contrast button again to access the Secondary contrast control.

Note: Setting contrast too high or too low reduces the range of shadow and highlight detail of the displayed image, causing color saturation to appear incorrect.



Backlight Control

To adjust the backlight level of your monitor, tap the  or  buttons.

Stabilization is a feature that resets an adjusted backlight level to the factory preset level. To enable or disable Stabilization, tap the **SCROLL** button and tap the  or  buttons to toggle the selection.

Note: Lower backlight levels increase backlight lifetime.

Enclosure Assembly and Cleaning

Cable Cover Installation

1. Connect power, control, and video cables before installing the cable cover.
2. Align the cable cover to the cable well recess on the back of the display.
3. Slide the cable cover forward into the recess, with cables positioned under the cut-outs.
4. Slide the cable cover forward until tabs on the bottom edge click into place.
5. If provided, use two thumb screws to secure the cable cover in the upper left and right corners.

Cleaning Instructions



Caution: Prior to cleaning, units should be turned OFF and disconnected from respective power sources.

- Do not allow liquids to enter the interior of the unit, as severe damage to the unit can result.
- Do not use solvents such as benzene or thinner, or any acid, alkaline or abrasive detergents.

Thoroughly wipe all the front glass and plastic enclosure surfaces with a lint free cloth dampened with a mild glass cleaner such as 70% isopropyl alcohol, distilled 5% acidity white vinegar, or ammonia- or non-ammonia-based glass cleaners. Do not use harsh solvents, abrasive detergents, or chemical cleaning cloths.

Connector Panels Overview

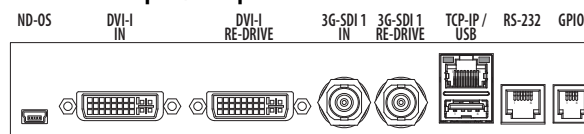
Radiance Ultra Product Configurations

Product Number	Product Configurations				Secondary Board Configurations		
	27"	32"	ZeroWire Receiver	TruColor	Digital Input/Output	Analog Input/Output	No Input/Output
90R0100	✓				✓		
90R0102	✓					✓	
90R0104	✓						✓
90R0106		✓			✓		
90R0107		✓				✓	
90R0108		✓					✓
90R0109	✓		✓				✓
90R0110		✓	✓				✓
90R0112		✓		✓	✓		
90R0113		✓		✓		✓	
90R0114		✓		✓			✓
90R0115		✓	✓	✓			✓

Radiance Ultra Connector Panels

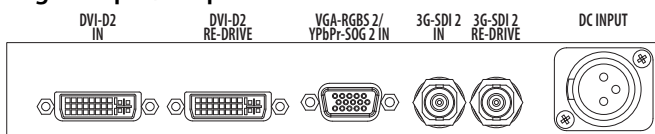
Primary Board

Standard Input/Output

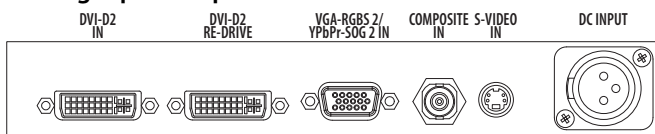


Secondary Boards

Digital Input/Output



Analog Input/Output



No Input/Output



Notes

- 3G-SDI 1 and 3G-SDI 2 accept 3G-SDI signals.
- DVI-I and DVI-D2, 3G-SDI 1 and 3G-SDI 2 RE-DRIVE outputs are active only with display powered on.
- ND-OS connector is designated for installing firmware upgrades. The ND-OS connector can also be used for display control. See "Communication Port" on page 8.

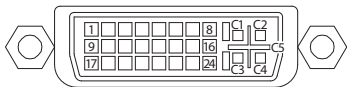
Connector Types

Inputs	Connector Types	Outputs	Connector Types
DVI-1	DVI-I (1920 x 1200 max)	DVI-1	DVI-I
SDI-1, SDI-2	BNC	RGBS-1/YPbPr-1/VGA-1/SOG-1	DVI-I
RGBS-1/YPbPr-1/VGA-1/SOG-1	DVI-I	DVI-2	DVI-D
RGBS-2/YPbPr-2/VGA-2/SOG-2	HD-15	SDI 1, SDI 2	BNC
DVI-2	DVI-D (1920 x 1200 max)		
Composite	BNC		
S-Video	DIN-4		

Data Connectors and Pinouts

DVI-I Digital and Analog

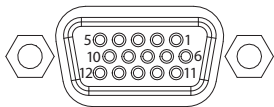
DVI-I IN Supports digital and analog (RGBS / YPbPr) signals. Analog data appears on pin 8, and pins C1 - C5.



Pin	Signal	Pin	Signal	Pin	Signal
1	T.M.D.S. DATA 2-	11	T.M.D.S. DATA 1/3 SHIELD	21	T.M.D.S. DATA 5+
2	T.M.D.S. DATA 2+	12	T.M.D.S. DATA 3-	22	T.M.D.S. CLOCK SHIELD
3	T.M.D.S. DATA 2/4 SHIELD	13	T.M.D.S. DATA 3+	23	T.M.D.S. CLOCK+
4	T.M.D.S. DATA 4-	14	+5V POWER	24	T.M.D.S. CLOCK-
5	T.M.D.S. DATA 4+	15	GND	DVI-I IN Only	
6	DDC CLOCK	16	HOT PLUG DETECT	C1	ANALOG RED
7	DDC DATA	17	T.M.D.S. DATA 0-	C2	ANALOG GREEN
8	ANALOG VERTICAL SYNC (DVI-I IN Only)	18	T.M.D.S. DATA 0+	C3	ANALOG BLUE
9	T.M.D.S. DATA 1-	19	T.M.D.S. DATA 0/5 SHIELD	C4	ANALOG HORIZONTAL SYNC
10	T.M.D.S. DATA 1+	20	T.M.D.S. DATA 5-	C5	ANALOG GROUND

VGA

VGA IN supports RGBS 2, YPbPr, and SOG 2 signals.



Pin	Description	Pin	Description	Pin	Description
1	RED	6	GND RED	11	N. C.
2	GREEN	7	GND GREEN	12	DDC_SDA
3	BLUE	8	GND BLUE	13	HORIZ SYNC
4	N.C.	9	+5VD	14	VERT SYNC.
5	GND	10	SYNC GND	15	DDC_SCL

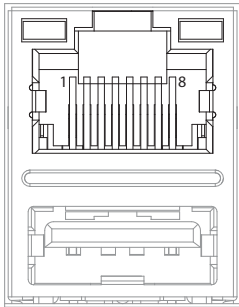
S-Video



Pin	Name	Description
1	GND	Ground (Y)
2	GND	Ground (Y)
3	Y	Intensity (Luminance)
4	C	Intensity (Chrominance)

Control Connectors and Pinouts

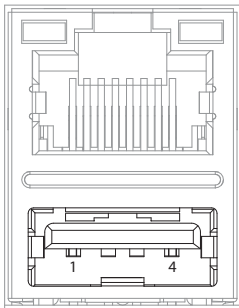
TCP-IP



Pin	Signal	Description
1	TX+	No Connection
2	TX-	Transmit Return
3	RX+	Receive
4	N/C	No Connection
5	N/C	No Connection
6	RX-	Receive Return
7	N/C	No Connection
8	N/C	No Connection

USB

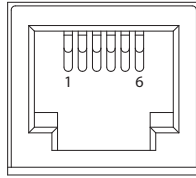
Flash Upgrade Cable, part number 35Z0047, is available from NDS.



Pin	Name	Description
1	VCC	+5 VDC
2	D-	Data Transmit Return
3	D+	Data Transmit
4	GND	Ground

RJ-11 (6 pin) RS-232 Serial Control

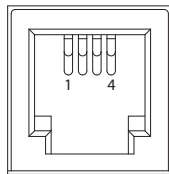
RJ-11 Serial Command Adapter Cable, part number 35Z0093, is available from NDS.



Pin	Name	Description
1	N/C	No Connection
2	N/C	No Connection
3	N/C	No Connection
4	RXD	Receive
5	GND	Ground
6	TXD	Transmit

General Purpose Input/Output Connector

RJH 4-pin Telephone Handset Connector



Pin	Name	Description
1	Swap	Swap P and S Inputs
2	P.S.	PIP Size
3	R.I.	Record Indicator
4	GND	Ground

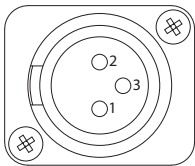
Swap: Closing the Swap Pin to GND swaps the position and size of the Primary and Secondary images. See page 12 for details.

PIP Size: The size of Secondary image increases each time the PIP Size is connected to GND. See page 12 for details.

Record Indicator: The Record Indicator is displayed while a contact closure to the GND is present, the indicator is removed when the contact is opened. The Record Indicator is displayed in the monitor's top left corner.

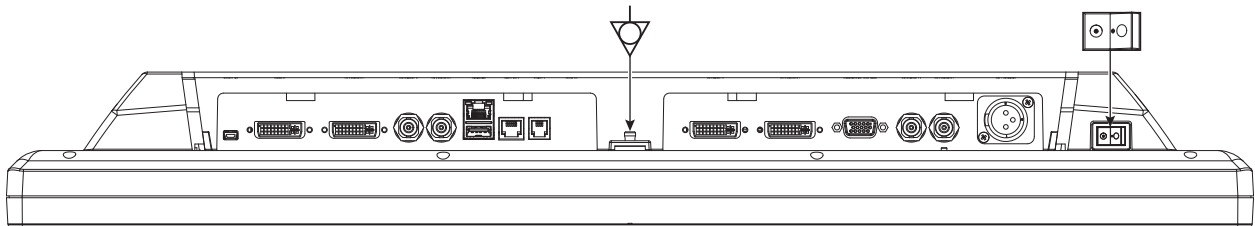
Power Connector and Pinout

24 VDC Connector



Pin	Name	Description
1	GND	Ground
2	GND	Ground
3	+24 VDC	Power Input

Electrical Symbols



-  **Equipotentiality**
This symbol appears next to the display Potential Equalization Conductor (ground post).
-  **Closed (On) Switch**
This symbol appears on the closed, or on, side of the display On/Off switch.
-  **Open (Off) Switch**
This symbol appears on the open, or off, side of the display On/Off switch.

Cable Bend Radius

-  We recommend that the bend radius of metallic cables be no less than 63 mm (2.5 inches) or 7 times the diameter of the cable whichever is greater. The bend radius of Fiber Optic cables should be no less than 10 times the diameter of the cable. Sharper bends can damage the cable, and/or degrade the video signal.

Specifications and Supported Resolutions

Specifications

Specifications are subject to change without notice. Contact factory for current specifications.

	Radiance Ultra 27"	Radiance Ultra 32"	Radiance Ultra 32" TruColor
Viewing Area (Diagonal)	27.0 in. (685 mm)	31.5 in. (800 mm)	31.5 in. (800 mm)
Typical Luminance ^a (cd/m ²)	900	400	650
Native Resolution	1920 x 1080	1920 x 1080	1920 x 1080
Pixel Pitch (mm)	0.311	0.364	0.364
Viewing Angle (Horizontal & Vertical)	178°	178°	178°
Contrast Ratio (Nominal)	1000:1	1100:1	1100:1
Color Gamut	BT.709/SMPTE-C	BT.709/SMPTE-C	120% BT.709
VGA Input Signal Level at 75 Ohms	0.7 V p-p	0.7 V p-p	0.7 V p-p
HD-SDI Input Signal Level	0.8 – 2.0 V p-p	0.8 – 2.0 V p-p	0.8 – 2.0 V p-p
S-Video Input Signal Level	0.7 V p-p	0.7 V p-p	0.7 V p-p
Composite Input Signal Level	0.7 V p-p	0.7 V p-p	0.7 V p-p
Sync On Green (SOG)	0.7 V p-p	0.7 V p-p	0.7 V p-p
RGBS Input Signal Level	0.7 V p-p	0.7 V p-p	0.7 V p-p
RGBS Input Sync Level	0.4 – 4.0 V p-p	0.4 – 4.0 V p-p	0.4 – 4.0 V p-p
DC Input	24 V / 6.25 A	24 V / 6.25 A	24 V / 6.25 A
DC Power Consumption (Nominal) ^b	70 W	52 W	87 W
AC Power Consumption (Nominal) ^b	81 W	60 W	98 W
Dimensions (W x H x D)	26.7 x 17.5 x 3.3 in. (678 x 445 x 84 mm)	30.7 x 20.1 x 3.4 in. (780 x 511 x 86 mm)	30.7 x 20.1 x 3.4 in. (780 x 511 x 86 mm)
Display Weight	19.5 lb. (8.9 Kg)	24.0 lb. (11 Kg)	29.0 lb. (13.2 Kg)
Operating Temperature	32 – 104°F (0 – 40°C)	32 – 104°F (0 – 40°C)	32 – 104°F (0 – 40°C)
Storage Temperature	4 – 122°F (-20 – 50°C)	4 – 122°F (-20 – 50°C)	4 – 122°F (-20 – 50°C)
Operating Humidity (Non-condensing)	20 – 85%	20 – 85%	20 – 85%
Storage Humidity (Non-condensing)	5 – 85%	10 – 90%	10 – 90%
Transport Humidity (Non-condensing)	5 – 85%	10 – 90%	10 – 90%
Operating Altitude (Maximum)	6,600 ft. (2,000 m)	6,600 ft. (2,000 m)	6,600 ft. (2,000 m)
Storage Altitude (Maximum)	33,000 ft. (10,000 m)	33,000 ft. (10,000 m)	33,000 ft. (10,000 m)

a. Brightness shown is without a Touch Screen or A/R filter installed.

b. Applies to the Bridge Power BPM150S24F06 power supply.

Supported Resolutions

DVI Supported Resolutions

Signal Parameter	Supported Range
Active Resolution (Horizontal x Vertical)	640 x 480 min to 1920 x 1200 max
Refresh Rate (Vertical Frequency)	23.98 Hz up to 85 HZ
Pixel Clock (Pixel Frequency)	25 MHz up to 165 MHz

The DVI-D input can automatically detect any valid digital DVI signal within the resolution, vertical refresh, and pixel clock ranges specified in the table above. Signals outside of any of the specified ranges may not be supported.

SDI Supported Resolutions

Horizontal Resolution (pixels)	Vertical Resolution (lines)	Vertical Frequency (Hz)	Horizontal Resolution (pixels)	Vertical Resolution (lines)	Vertical Frequency (Hz)
720	480i	29.97	1280	720p	59.94
720	483i	29.97	1920	1080sF	24
720	487i	29.97	1920	1080p	24
720	576i	25	1920	1080p	25
720	587i	25	1920	1080p	29.97
1280	720p	24	1920	1080i	25
1280	720p	25	1920	1080i	29.97
1280	720p	30	1920	1080p	50
1280	720p	50	1920	1080p	59.94

VGA, RGBS, and YPbPr Supported Resolutions

Horizontal Resolution (pixels)	Vertical Resolution (lines)	Vertical Frequency (Hz)	Horizontal Resolution (pixels)	Vertical Resolution (lines)	Vertical Frequency (Hz)	Horizontal Resolution (pixels)	Vertical Resolution (lines)	Vertical Frequency (Hz)
720	480i	29.97	640	480	60	1280	960	60
720	487i	29.97	800	600	60.32	1280	1024	60.02
720	480p	59.94	1024	768	60	1600	1200	60
720	480p	60	1280	720p	50	1920	1080i	25
720	576i	25	11280	720p	59.94	1920	1080i	29.97
720	576p	50	1280	960	59.94	1920	1080p	50
						1920	1080p	59.94

ZeroWire® Embedded Technology

Note: Information and procedures in this section apply only to use of Radiance Ultra displays configured with the optional pre-installed embedded ZeroWire Receiver.

Warnings and Cautions

This product is a Class I medical device according to M.D.D. in Europe. No modifications are allowed.

This product is a Class II medical device in the United States and Canada. No modifications are allowed.

This equipment/system is intended for use by healthcare professionals only.

Federal law restricts this device to sale by or on the order of a medical practitioner.

These are the European countries that accept CE marked devices: Belgium, Bulgaria, Croatia, Cyprus, Germany, Hungary, Iceland, Macedonia, Montenegro, Norway, Romania, Slovakia, Spain, Switzerland and United Kingdom.



Safety Compliance:

This product is T.U.V. approved with respect to electric shock, fire and mechanical hazards only in accordance with CAN/CSA C22.2 No. 60601-1 and ANSI/AAMI ES60601-1.



Safety Compliance:

This device meets the requirements of EN60601-1 so as to conform to the Medical Device Directive 93/42/EEC and 2007/47/EC (general safety information).

Radio Approval:

This device meets the requirements of EN 302 065 V1.2.1 and conforms to Radio and Telecommunications Terminal Equipment (R&TTE) Directive 1999/5/EC.

FCC Identification: UK2-SII-SK63102, UK2-SII-SK63101

Industry Canada: 6705A-SIISK63102, 6705A-SIISK63101

The ZeroWire Transmitter complies to the above standards only when used with the supplied medical grade power supply:

Model	ZeroWire
Power Supply	Ault MW172KB2400B02 or GlobTek GTM91120-3024-T3A
AC Input	100 to 240 Volts at 50 to 60 Hz
DC Output	Ault 24 Volts at 0.75 Amps / GlobTek 24 Volts at 1.25 Amps

Intended Use and Contraindications

Intended Use

The Radiance Ultra series ZeroWire Embedded and ZeroWire G2 is a paired wireless video communication transmitter and receiver, intended for delivery of video signals from a source such as an endoscopy camera/processor, or other video source over a radio-frequency link to a ZeroWire Receiver for display of images during endoscopic and general surgical procedures. The Radiance Ultra series and ZeroWire G2 wireless video system is a non-sterile reusable device not intended for use in the sterile field.

Contraindications

1. This equipment may not be used in the presence of flammable anesthetics mixture with air, oxygen or nitrous oxide.
2. No part of this product may come in contact with a patient. Never touch the product and a patient at the same time.

Warnings



Do not use in MR environments.



For mission critical applications, we strongly recommend that a replacement ZeroWire transmitter and receiver pair, and a DVI cable, be immediately available. Additionally, we recommend that a display that is hard wired to the video source be immediately available whenever a surgical procedure is in progress.



At any time, a minimum separation of 20 cm must be maintained from the operating device and the user or patient.

ZeroWire Specifications:

The ZeroWire System provides wireless delivery of video signals from the DVI or 3G-SDI output of OR video sources to the DVI input of a video display. It operates as a 60GHz-based wireless HD system in compliance with FCC (Part 15) rules governing the unlicensed 57-64 GHz band which is located in the millimeter-wave (mmW) portion of the electromagnetic spectrum.

The Transmitter is mounted on the top rear edge of a display, and receives input video signals directly from an endoscopic camera processor or from the DVI or SDI re-drive outputs of the display. For information on mounting and connecting the ZeroWire Transmitter to a display, please refer to the ZeroWire User Manual.

Wireless Signal Type	60 GHz Wireless HD band (WiHD)
Frequency Band	57 - 64 GHz
Video Compression	None
Video Inputs (Tx)	DVI-D, 3G-SDI
Video Outputs (Rx)	DVI-D
HIPAA Support	256 bit AES Encryption
System Latency	< 1 Frame
Maximum Pairs per OR	2 Pairs
RF Power Out	< 28 dBm/MHz EIRP
Maximum Range	< 30 ft (9.14m)
Data Rate	50 Mbps - 3.8 Gb/s
Power Consumption	< 8 Watts

Maximum EIRP Output Power of Test Frequency

Channels	Maximum EIRP Output Power of Test Frequency	Average EIRP Output Power
LRP Low Channel	60.32 GHz	11.7 dBm
LRP High Channel	62.79 GHz	12.1 dBm
HRP Low Channel	60.48 GHz	29.3 dBm
HRP High Channel	62.64 GHz	29.6 dBm

Noninterference Distance

The listed devices on the following table have been tested to demonstrate the minimum safe distances for the ZeroWire to be operating without any interference with each other. At any time, if the ZeroWire is believed to be causing or getting the interference from those devices, simply move the devices away from each other, and then maintain at least the separations as specified in the table.

Tested Equipment	Distance to Transmitter	Distance to Receiver
Electrocautery	> 2 feet	> 1 foot
RFID	> 1 cm	> 1 cm
2.4Ghz Wireless Access Point	> 6 inches	> 6 inches
5.8Ghz Wireless Access Point	> 6 inches	> 6 inches
Cell Phone	> 1 cm	> 1 cm
Bluetooth Device	> 1 cm	> 1 cm

Avoiding Co-Channel Interference

If the ZeroWire G2 deployment is a typical one-system per room, there are essentially no restrictions. The transmitter's Channel Selection feature picks the channel that is least susceptible to interference from the two available channels based on the result of its scan at power on.

Some of the factors affecting isolation of the ZeroWire G2 channels are listed below:

1. The thickness and material of the room walls.
2. The opening and closing of room doors.
3. The room's ceiling structure and the materials used in its construction.

ZeroWire G2 Transmitter/Receiver pairs must be installed in the same room. Cross room operation is not supported. When two Transmitter/Receiver pairs are installed in a given room, each pair must be linked separately, one pair at a time, linking the second pair after successfully linking the first. There is no need to turn off the first linked pair before powering or linking the second pair.

Channel Usage

The recommendations listed below should be used to determine the appropriate setting:

1. ZeroWire G2 Transmitter and/or Receiver units cannot be used with earlier ZeroWire Transmitter and/or Receiver units.
2. A maximum of two ZeroWire systems may be operated in the same room. The linked Transmitter and Receiver pairs should be separated by at least 3 feet (1 m) within the room.
3. Groups of two ZeroWire systems may be set in multiple rooms, providing the rooms are spaced at least 25 feet (7.6 m) apart.
4. ZeroWire G2 Transmitters and Receivers should not be installed in metal cabinets or surrounded by metallic objects, as this will prevent Transmitter communication with the Receiver.

Multi System Installation

When two paired Transmitter and Receiver systems are to be installed in a given OR, use the following procedure:

1. If the Transmitters and Receivers have not been linked, power up the first Transmitter and Receiver pair, and follow the Linking Procedure described on page 30.
2. Power up the second Transmitter and Receiver pair, and repeat the Linking Procedure. Transmitter and Receiver pairs must be linked one pair at a time. We recommend that linked pairs be labeled to facilitate installation and troubleshooting.

Performance

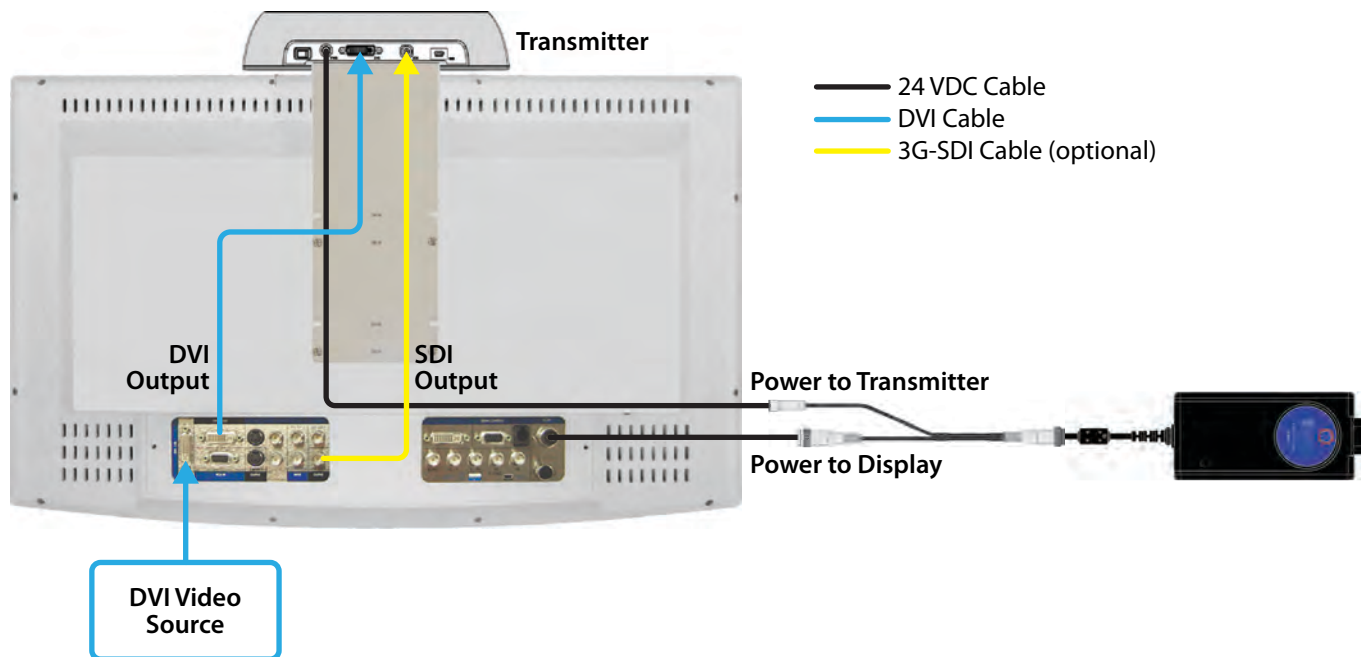
ZeroWire HD Wireless Video System is intended and optimized for use in surgical or procedure rooms. Usage outside of a clinical environment is not recommended.

The following steps will help you to achieve optimal performance of the ZeroWire system:

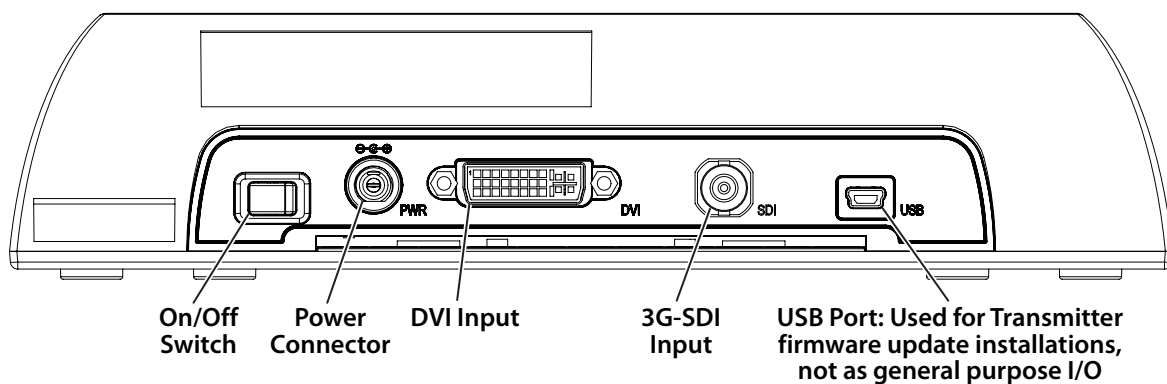
1. Mount both components at least 5 feet (1.5 m) from the floor.
2. Ideally, both the Transmitter and Receiver should be at the same height.
3. For a reliable video link, please follow the setup guidelines described on page 29.
4. The Transmitter and Receiver should be facing each other and be visible to each other in free air space.
5. For non-line-of-sight applications, we recommend that Transmitters and Receivers be located ≤ 6 feet (1.8 m) or less from the walls.

ZeroWire Transmitter Setup

ZeroWire G2 Transmitter Wiring



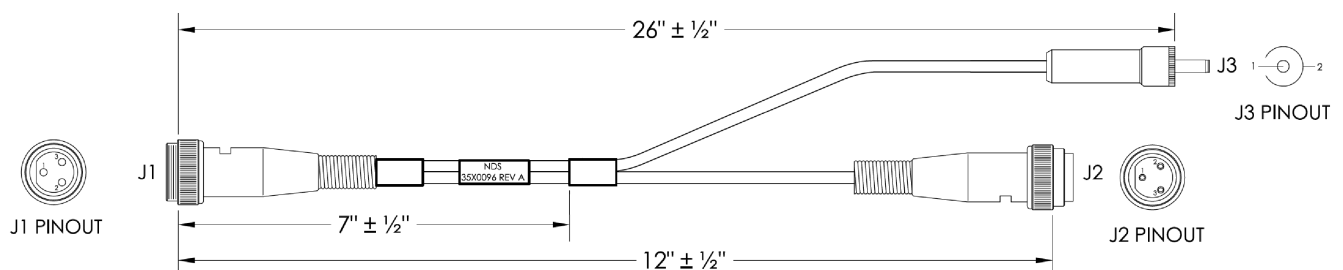
ZeroWire G2 Transmitter Connector Panel



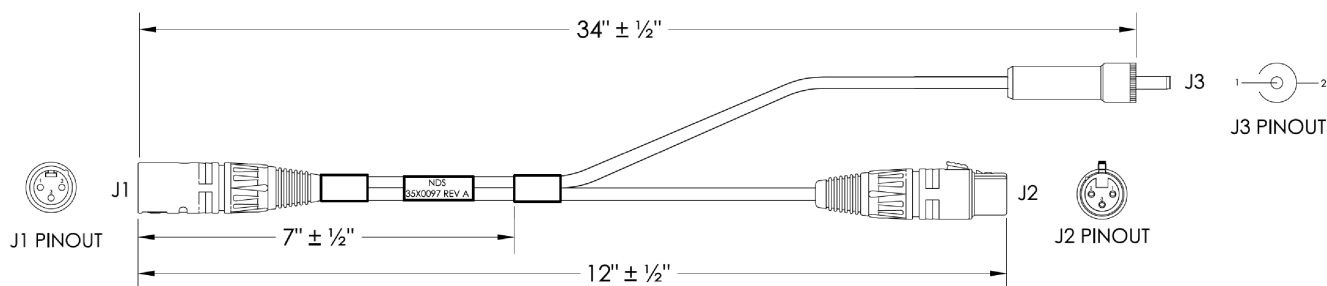
ZeroWire G2 Transmitter 'Y' Adapter Cables

ZeroWire G2 Transmitters and Receivers used with NDS supported displays of up to 32" can use an optional 'Y' adapter cable for powering the ZeroWire unit. Two types of 'Y' adapter cables are available. Where applicable, the appropriate Y-cable is included in the display accessory kit.

SwitchCraft 'Y' Adapter Cable (35X0096)



XLR 'Y' Adapter Cable (35X0097)



ZeroWire G2 Transmitter Power Supplies

ZeroWire Transmitter and Receiver units can be directly powered with the included 24 VDC power supply.



When using a power supply, select and install the plug adapter that matches the power requirement.

GlobTek GTM91120-3024-T3A

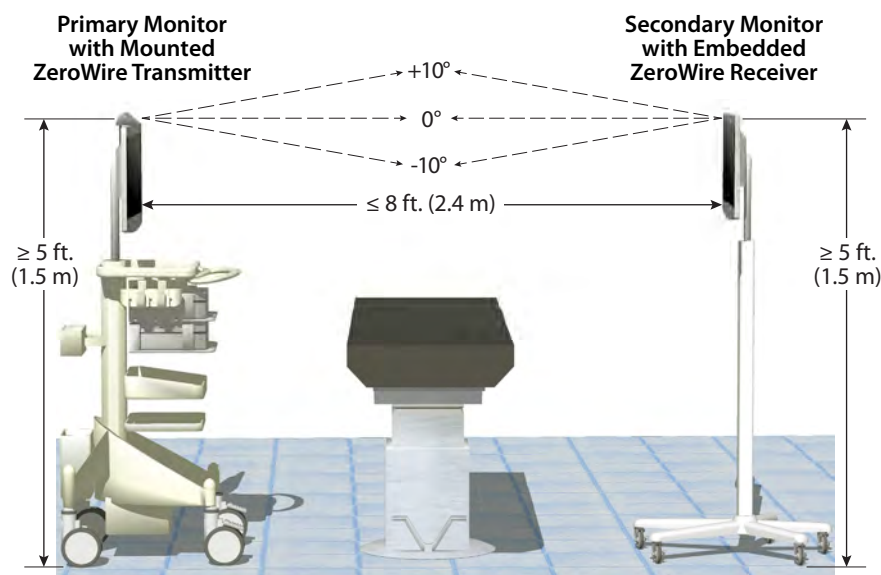


Ault MW172KB2400B02



Positioning and Orientation

Position the Primary Monitor with mounted ZeroWire Transmitter and the Secondary Monitor with embedded ZeroWire Receiver at a distance of ≤ 8 feet (2.4 meters), and confirm that both displays are aligned vertically and horizontally within $\pm 10^\circ$ at heights of ≥ 5 feet (1.5 meters) as shown below.

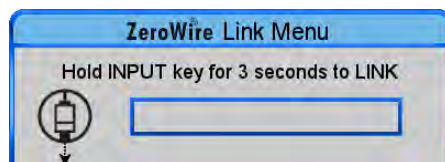


ZeroWire Quick Start Linking

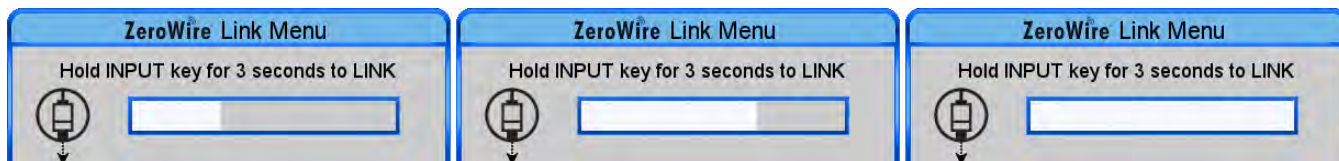
1. Connect a DVI or SDI video source to the display-mounted ZeroWire Transmitter.
2. On the receiving Radiance Ultra ZeroWire display, tap the **INPUT** button three times to access the Input Menu.
3. Confirm that ZeroWire is available as Primary input.



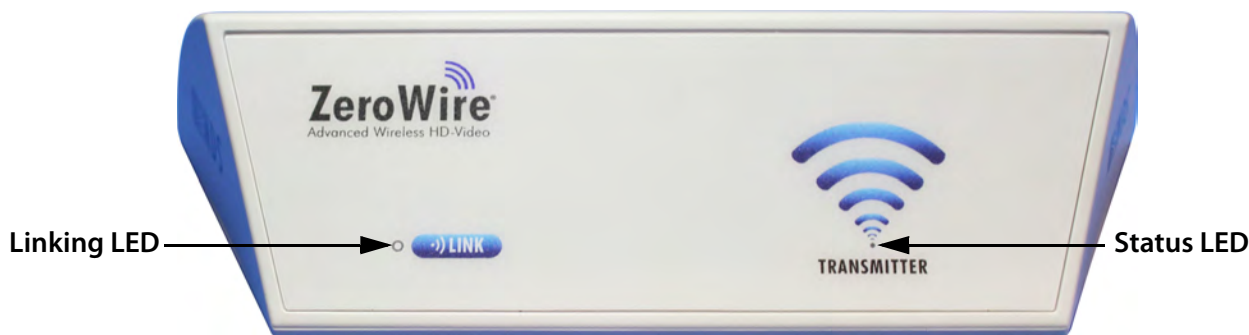
4. Tap the **INPUT** button to close the Input Menu, and then tap it once again to access the ZeroWire Link Menu.



5. Press and hold the **INPUT** button for three seconds until the progress bar fills the box.



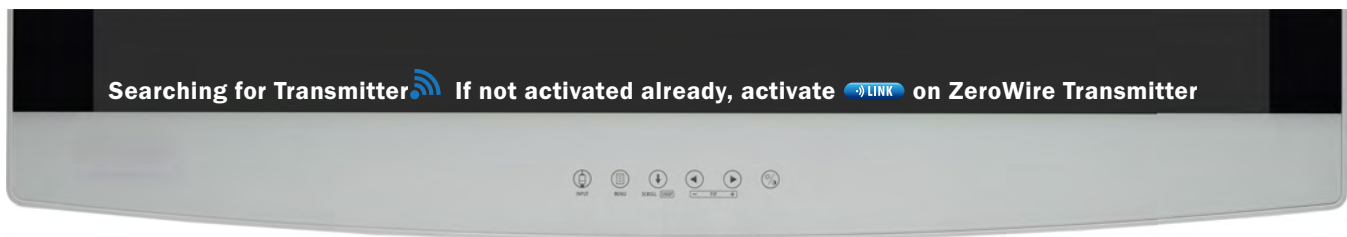
6. At the display-mounted ZeroWire Transmitter, press and hold the **LINK** button until the blue Linking LED begins flashing. After the Transmitter and Receiver units identify each other and begin linking, both the Linking and Status LEDs will flash rapidly for several seconds.



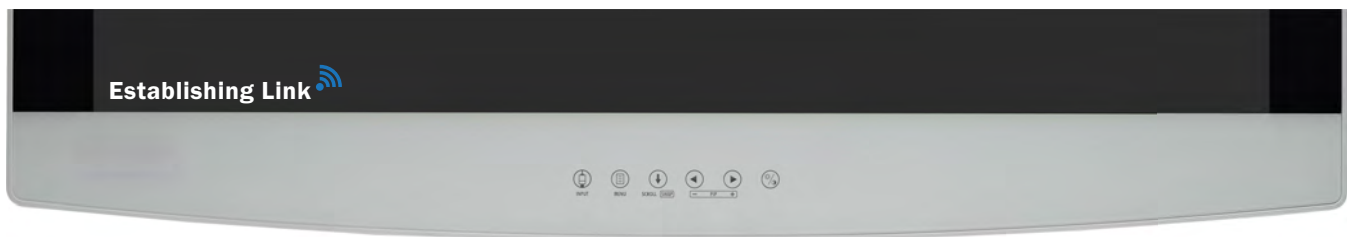
7. In the lower left corner of the receiving Radiance Ultra ZeroWire display, a series of status messages will indicate stages of the linking process.

Wireless Linking Status Messages

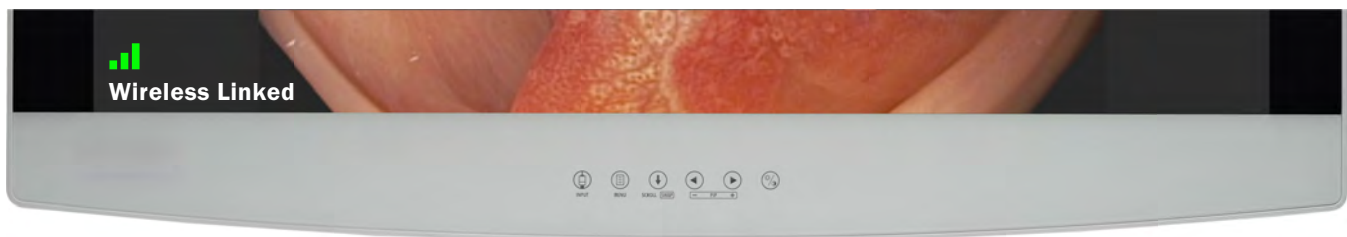
When initiating a link, the typical sequence of status messages presented on the Receiver display begins with “Searching for Transmitter” and a reminder to activate the Transmitter.



Stage 1: Searching for Transmitter - If not activated already, activate LINK on ZeroWire Transmitter

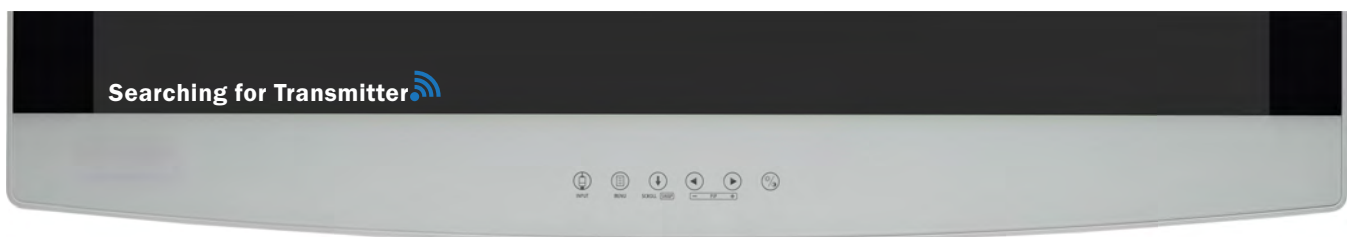


Stage 2: Establishing Link



Stage 3: Wireless Linked

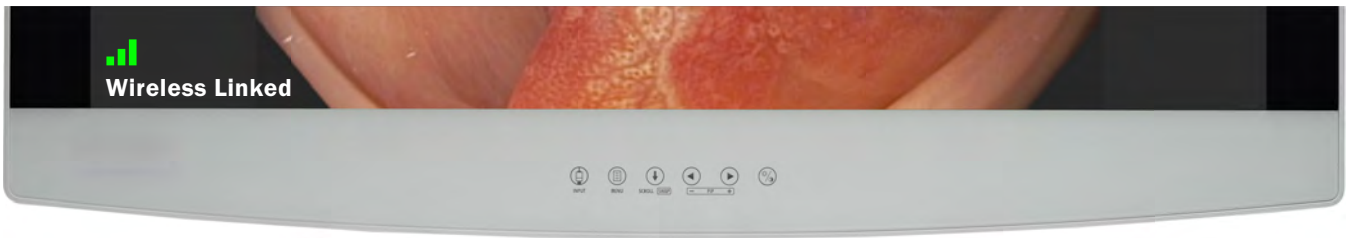
When restoring power to a previously linked system, the typical sequence of status messages presented on the Receiver display begins with “Searching for Transmitter.”



Stage 1: Searching for Transmitter

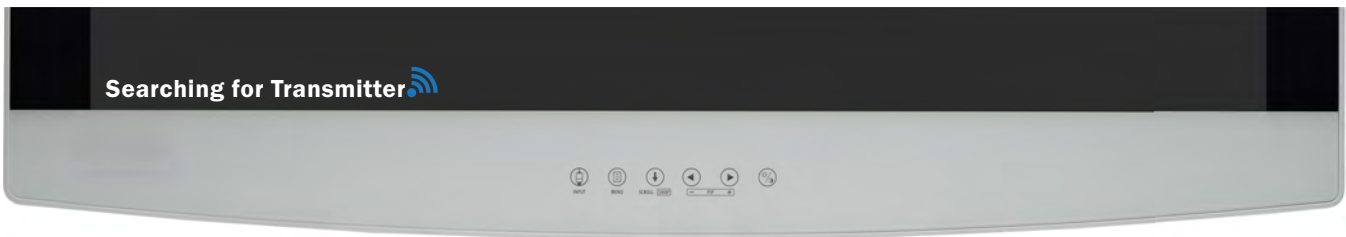


Stage 2: Establishing Link



Stage 3: Wireless Linked

If a link cannot be established or verified within 60 seconds, the “No Transmitter Found” status message will be presented on the Receiver display. For suggestions on how to solve linking problems, see “ZeroWire Troubleshooting” on page 34.



Stage 1: Searching for Transmitter



Stage 2: No Transmitter Found

Troubleshooting

Display Troubleshooting

Image Size is Large for the Screen (VGA, RGBS, YPbPr, or SOG analog inputs only)

If the image does not appear to be the correct format, then SmartSync must be run. To run SmartSync, press the MENU button. In the Picture Menu, tap the **SCROLL** button to highlight SmartSync and tap the  button. SmartSync will run and optimize the image display properties.

Ghosting in Characters

Ghosting in characters is usually attributed to reflections in the video cable or source. Use a high quality cable and, if possible, lower the vertical refresh rate. Lower scan rates can help eliminate reflections. Unlike a CRT, a flat-panel will not flicker at lower refresh rates (60 Hz is optimal) and data update will be the same at all refresh rates.

Character Jitter (VGA, RGBS, YPbPr, SOG analog inputs only)

If text characters seem to be “shaky” or bold, then Sharpness, Frequency and/or Phase may require adjusting. See “Setting Frequency, Phase and Sharpness” below.

Character Noise and Vertical Distortion (VGA, RGBS, YPbPr, or SOG analog inputs only)

The Frequency adjustment expands or contracts the horizontal size of the displayed image. The displayed image may be too wide or too narrow and vertical banding and pixel jitter may appear in grays and light colors. Adjust the Frequency until the image just fits the screen. Horizontal position adjustment can be used to verify that Frequency is set correctly. Line up the image on the left edge of the screen and then shift by one “click” to the right. The image should have one column off the screen on the right side if the Frequency is set correctly.

Testing and Adjusting Frequency (VGA, RGBS, YPbPr, or SOG analog inputs only)

Using a connected laptop, open a blank text file, center the file window in the display, and set the font size and style to 8 points Regular. Tap the Enter key to move the cursor down to the center of the page, and then press and hold the Shift and + keys to create a row of + symbols.

Inconsistent lighter or darker display variations of the + symbols is an indication that the Frequency parameter requires adjustment. Tap the **MENU** button to open the Display Menu, tap the  button to select the Picture Menu, then tap the **SCROLL** button to select the Frequency parameter. Next, tap the  or  buttons to increase or decrease Frequency until reaching a point where all + symbols display equally.

Note: Sharpness and Phase are subtle adjustments best set using a display calibration program.

Black Screen

Power the display Off and On. If the logo screen appears then the display is working properly. Check if the power management feature (DPMS) is enabled. A “Searching” message appears in the lower right hand corner when a video source is not present.

ZeroWire Troubleshooting

Startup

Transmitter Indicator LED is not on

Loose Power Connector: Verify that the power source connector is fully inserted into the unit's power connector.

Y' Cable: If you are using the 'Y' cable to supply power to the ZeroWire display-mounted transformer, confirm that it is connected to an NDS 24VDC power supply and that the power supply is energized.

Stand Alone Power Supply: If the stand alone power supply is being used confirm that it is fully inserted into the wall socket.

Wall Socket: Some wall sockets have built-in On/Off switches. If the socket being used has a built-in switch, check that it is in the On position.

See "ZeroWire Transmitter Setup" on page 28.

No transmitter found

Verify the Transmitter unit is ON or Source signal is connected.

No image on display after changing input resolution

Cycle both ZeroWire Transmitter's and Receiver's power.

Poor or Intermittent Video

Transmitter and Receiver are spaced more than 30 feet (9.1 m) apart

See "Positioning and Orientation" on page 29.

DVI or SDI (Transmitter only) connections

Confirm that the cables are properly connected.

Crosstalk

See "Avoiding Co-Channel Interference" on page 27.

Low signal strength

See "ZeroWire Receiver Status Messages" on page 4.

Transmitter and Receiver are switched

Verify that the video source is connected to the Transmitter, not the Receiver.

Status LED Indicators

Blue and blinking slowly

The unit is scanning for a channel.

Blue and flashing rapidly

The unit is attempting to link.

Blue and steady

The unit is sending (Transmitter) or receiving (Receiver) video data.

Blue alternating ON/OFF for 3 seconds

No Linking Information stored.

Electromagnetic Compatibility Tables

ZeroWire has been tested in an OR environment and the product did not interfere with electrosurgical, ultrasound, X-Ray, medical displays and life monitoring equipment. Neither did the aforementioned equipment interfere with ZeroWire. Additionally, since ZeroWire operates in 57 – 64 GHz, typically wireless LAN and mobile phones will not cause interference as they operate outside the ZeroWire frequency range. However, the presence of a source of interference within ZeroWire frequency range may result in intermittent operation and reduced image quality or the link could go down while the interference exists. Prior to any procedure in the OR, it is required that any such equipment be turned off and verify that the system operates as expected. If any anomalous behavior is observed, it must be corrected prior to using the system in any surgical procedures.

ZeroWire transmitters should be separated by at least 20 inches (0.5 m). ZeroWire transmitters (Transmitter) or receivers (Receiver) should not be installed in metal cabinets or surrounded by metallic objects, as this will prevent the Transmitter from communicating with the Receiver.

During installation the ZeroWire link video quality should be tested with the Transmitter and Receiver at different orientation angles, acceptable orientation angles are shown on page 10. Non-line-of-sight operation is discussed under “Performance” on page 27. We recommend that the system be thoroughly tested prior to using it in any surgical procedures.

Do not use power supplies or cable accessories with the ZeroWire other than those specified in this manual. Excessive leakage currents, elevated electromagnetic emissions, or insufficient interference immunity may occur.

All medical electronic devices, including ZeroWire, must conform to the requirements of IEC 60601-1-2. Precautions, adherences to the Electromagnetic Compatibility (EMC) guideline information provided in this manual and verification of all medical devices in simultaneous operation are required to ensure the electromagnetic compatibility and co-existence of all other medical devices prior to a surgical procedure.

The following EMC tables are provided for your reference:

- “Guidance and manufacturer’s declaration; electromagnetic emissions” on page 36
- “Guidance and manufacturer’s declaration; electromagnetic immunity” on page 36
- “Guidance and manufacturer’s declaration; electromagnetic immunity” on page 37
- “Recommended separation distances between portable and mobile RF communications equipment and the product” on page 38

Electromagnetic Emissions

Guidance and manufacturer's declaration; electromagnetic emissions

The product is intended for use in the electromagnetic environment specified below. The customer or the user of the product should assure that it is used in such an environment.

Emissions	Compliance	Electromagnetic environment-- guidance
RF emissions CISPR 11	Group 1	The product uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment. The product is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Electromagnetic Immunity

Guidance and manufacturer's declaration; electromagnetic immunity

The product is intended for use in the electromagnetic environment specified below. The customer or the user of the product should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	The product uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines	±2 kV for power supply lines	The product is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Surge IEC 61000-4-5	±1 kV line(s) and neutral	±1 kV line(s) and neutral	Mains power quality should be that of a typical commercial or hospital environment
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0,5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0,5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If a dips or an interruption of mains power occurs, the current of the product may be dropped off from normal level, it may be necessary to use uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	Not applicable	Not applicable

NOTE: U_T is the AC mains voltage prior to application of the test level

Guidance and manufacturer's declaration; electromagnetic immunity

The product is intended for use in the electromagnetic environment specified below. The customer or the user of the product should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the product, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1,2\sqrt{P}$ $d = 1,2\sqrt{P} \text{ 80 MHz to 800 MHz}$ $d = 2,3\sqrt{P} \text{ 800 MHz to 2,5 GHz}$ Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer, and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey^a should be less than the compliance level in each frequency range^b. Interference may occur in the vicinity of equipment marked with the following symbol: 
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the product is used exceeds the applicable RF compliance level above, the product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the product.
- Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances

Recommended separation distances between portable and mobile RF communications equipment and the product

The product is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled.

The customer or the user of the product can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the product as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power (W) of transmitter	Separation distance, in meters according to frequency of transmitter		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2.5 GHz
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.



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NDS Quality System

ISO 9001:2008 and ISO 13485:2003
FDA Registration #2954921