

Root™

Operator's Manual



Root operating instructions provide the necessary information for proper operation of Root. There may be information provided in this manual that is not relevant for your system. Do not operate Root without completely reading and understanding the instructions in this manual.

NOTICE:

Purchase or possession of this instrument does not carry any express or implied license to use this instrument with replacement parts which would, alone or in combination with this instrument, fall within the scope of one of the patents relating to this instrument.

Caution: Federal law restricts this device to sale by or on the order of a physician. .

For professional use. See instructions for use for full prescribing information, including indications, contraindications, warnings, precautions and adverse events.

Wireless Radio

IC:7362A-RDS7 IC Model: RDS-7

FCC ID: VKF-RDS7 Model - RDS-7

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Medical electrical equipment with respect to electric shock, fire and mechanical hazards only in accordance with UL 60601-1/CAN/CSA C22.2 No. 601.1

Patents: www.masimo.com/patents.htm

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About this Manual

This manual explains how to set up and use Root. Important safety information relating to general use of the product appears in this manual. Read and follow any warnings, cautions, and notes presented throughout this manual. The following are explanations of warnings, cautions and notes.

A *warning* is given when actions may result in a serious outcome (for example, injury, serious adverse effect and, death) to the patient or user. The following is an example of a warning:

WARNING: This is an example of a warning statement.

A *caution* is given when any special care is to be exercised by the patient or user to avoid injury to the patient, damage to Root or damage to other property. The following is an example of a caution:

CAUTION: This is an example of caution statement.

A *note* is given when additional general information is applicable. The following is an example of a note:

Note: This is an example of a note.

Product Description and Intended Use

Product Description

Root is a patient monitoring and connectivity platform to transform care. It offers multiple high-impact innovations for broad applications across the continuum of care.

- Instantly interpretable, high-visibility display of Masimo's breakthrough rainbow® and SET® measurements from Masimo's Radical-7® handheld monitor
- Intuitive, touchscreen navigation for easy and adaptable use in any hospital environment
- Flexible measurement expansion through Masimo Open Connect (MOC-9™)
- Designed for third-party measurement expansion to allow other companies to add to the platform measurements
- Built-in connectivity gateway through Iris™ for standalone devices such as IV pumps, ventilators, beds, and other patient monitors

Intended Use

Root is a docking station for the Radical-7 handheld monitor. It is also a platform device intended for use with MOC-9 modules. Root is intended to be used in hospitals and hospital-type facilities. It is not intended for home use.

For all prescribing information and instructions for use of the compatible medical technologies, refer to the operator's manual or instructions for use for the specific medical technology.

Safety Information, Warnings, and Cautions

The following section lists warnings, cautions, notes, and safety information for Root.

Root is to be operated by qualified personnel only. The manual, accessories, directions for use, all precautionary information, and specifications should be read before use.

Safety Information, Warnings, and Cautions

WARNING: Do not use Root if it appears to be damaged. Contact your biomedical engineering department for guidance before using Root.

WARNING: To ensure safety, avoid stacking multiple devices or placing anything on the instrument during operation.

WARNING: Do not place Root or accessories in any position that might cause it to fall on the patient.

WARNING: Do not use Root during magnetic resonance imaging (MRI).

WARNING: Explosion hazard: Do not use the Root in the presence of flammable anesthetics or other flammable substance in combination with air, oxygen-enriched environments or nitrous oxide.

WARNING: Replace only with fuses of same type, current rating, and voltage rating.

WARNING: Do not adjust, repair, open, disassemble or modify Root.

CAUTION: An operator may only perform maintenance procedures specifically described in the manual. Refer servicing to qualified service personnel trained in the repair of this device.

CAUTION: Do not place Root where the controls can be changed by the patient.

Note: Do not monitor more than a single patient at a time on Root.

General Information, Warnings and Cautions

WARNING: When placed on a flat surface, the device should be secured with a mounting system recommended by Masimo.

WARNING: Do not touch, press or rub the touchscreen with abrasive cleaning compounds, instruments, brushes or rough-surface materials, or bring them into contact with anything that could scratch the touchscreen.

WARNING: Do not use petroleum-based solutions, acetone solutions or other harsh solvents to clean Root. These substances affect the device's materials, and device failure can result.

CAUTION: Ensure that the speaker is not covered.

CAUTION: Do not place Root against a surface that may cause the alarm to be muffled.

CAUTION: Should the Radical-7 and Root become unable to communicate, parameters and measurements will not show on the Root display. This will not affect Radical-7's ability to monitor the patient.

Note: Root is not intended for use during patient transport outside the healthcare facility.

Note: Excessive cleaning solution can flow into the device and cause damage to internal components.

Compliance Information, Warnings and Cautions

WARNING: In accordance with international telecommunication requirements, the frequency band of 2.4 GHz and 5.15 to 5.25 GHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.

CAUTION: Disposal of product: Comply with local laws in the disposal of the instrument and/or its accessories.

Note: Cleared Use Only: The device and related accessories are cleared by the Food and Drug Administration (FDA) and are CE Marked for noninvasive patient monitoring and may not be used for any processes, procedures, experiments or any other use for which the device is not intended or cleared by the FDA or other applicable regulatory authorities, or in any manner inconsistent with the instructions for use or labeling.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for medical devices to the EN 60601-1-2: 2002, Medical Device Directive 93/42/EEC and Class A. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation.

Note: To satisfy RF exposure requirements, this device and its antenna must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Note: This device complies with Part 15 of the FCC Rules. 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 undesired operation.

Note: This Class A digital apparatus complies with Canadian ICES-003.

Note: Use Root in accordance with *Environmental Specifications* section in this manual.

Electrical Information, Warnings and Cautions

WARNING: Root may be used during electrocautery, but this may affect the accuracy or availability of the parameters and measurements.

WARNING: Root may be used during defibrillation, but this may affect the accuracy or availability of the parameters and measurements.

WARNING: Electrical shock hazard: Do not remove the back panel of the device. This could cause injury to personnel or device damage.

WARNING: Electrical shock hazard: The battery should be installed and/or removed from Root by qualified personnel only.

WARNING: Risk of explosion if battery is replaced with an incorrect type. Replace with Masimo supplied parts only.

WARNING: Do not incinerate the battery.

CAUTION: To ensure patient electrical isolation, connect only to medical technologies with electrically isolated circuits.

CAUTION: To minimize radio interference, other electrical equipment that emits radio frequency transmissions should not be in close proximity to Root.

CAUTION: Electrical shock hazard: Carry out periodic tests to verify that leakage currents of patient-applied circuits and the system are within acceptable limits as specified by the applicable safety standards. The summation of leakage currents must be checked and in compliance with IEC 60601-1 and UL60601-1. The system leakage current must be checked when connecting external equipment to the system. When an event such as a component drop of approximately 1 meter or greater or a spillage of blood or other liquids occurs, retest before further use. Injury to personnel could occur.

CAUTION: Electrical shock hazard: to protect against injury, follow the directions below:

- Avoid placing the device on surfaces with visible liquid spills.
- Do not soak or immerse the device in liquids.
- Use cleaning solutions only as instructed in this operator's manual. See **Cleaning** on page 87.

CAUTION: Electrical shock hazard: Injury to personnel could occur. Do not plug in or remove the power cord with wet hands. Ensure that your hands are clean and dry before touching the power cord.

CAUTION: Electrical shock and flammability hazard: Before cleaning Root, always turn it off and disconnect the power cord from the AC power supply.

CAUTION: If Root has not been used or charged within seven (7) days or more, then recharge the battery prior to use.

CAUTION: Do not under any circumstances remove the grounding conductor from the power plug.

CAUTION: Do not use extension cords or adapters of any type.

CAUTION: Only use the AC power cable provided by Masimo. Using a different AC power cable could cause damage to Root. Check the power cord and plug to ensure that it is intact and undamaged.

CAUTION: Use a grounded outlet for proper grounding. A hospital-grade outlet is required.

CAUTION: Do not connect to an electrical outlet controlled by a wall switch or dimmer.

CAUTION: Failure to plug in the AC power cable promptly after a low battery message may result in the device shutting down.

Note: Disconnect the instrument using the AC power cord connector.

Note: It is recommended that Root is attached to an AC power source when it is not in use to ensure that the battery remains fully charged.

Note: For medical technologies that require AC power, the battery should be adequately charged to ensure backup power in case of AC power disruption.

Note: If there is any doubt about the integrity of the protective earth conductor arrangement, operate Root on internal battery power until the AC power supply protective conductor is fully functional.

Chapter 1: Description

Root can be used in the following ways:

- As a docking station and charger for Radical-7
- As a bedside monitoring display for parameters on Radical-7 and MOC-9 modules
- As a connectivity gateway for standalone devices.

Features

Front View

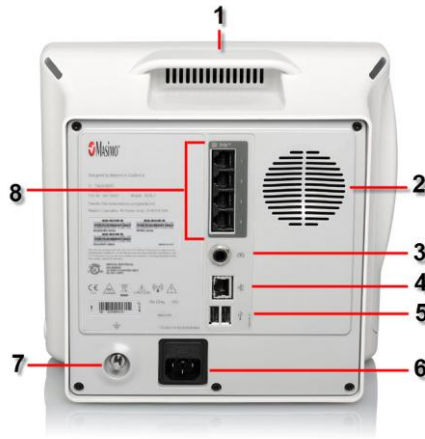


Ref.	Feature	Description
1	Docking Station	Provides a docking station for the Radical-7. While docked, the Radical-7 can communicate monitored parameters and measurements.*
2	Root Display and Touchscreen	Provides an interface for user interactions.
3	Home Button	Provides access to the Main Screen.
4	Root Charging Indicator	Shows an indication of the battery charge for Root.

Ref.	Feature	Description
5	AC Power Indicator	Shows an indication of AC power connection Root.
6	Radical-7 Charging Indicator	Shows an indication of battery charge for the Radical-7 in the Docking Station.

**Only the touchscreen version of the Radical-7 is able to communicate monitored parameters and measurements. All other versions can only charge in the docking station but not communicate with Root.*

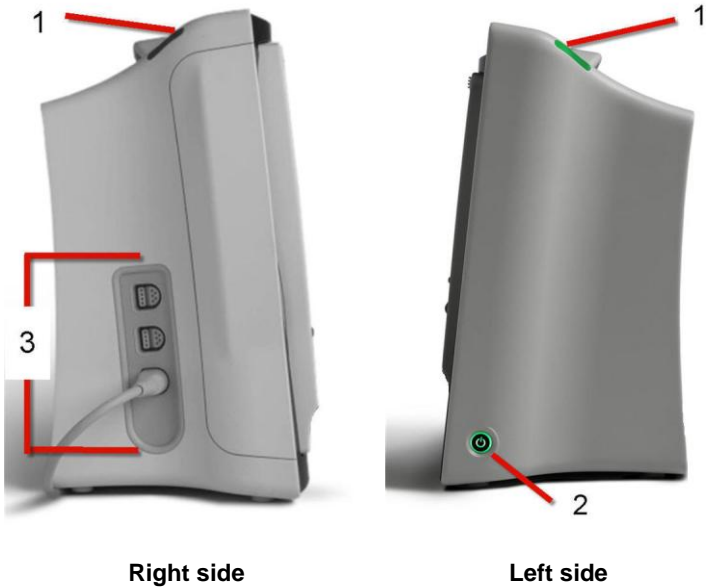
Back View



	Feature	Description
1	Handle	Allows the user to transport Root.
2	Speaker	Provides audible notification.
3	Nurse Call Connector	Provides a connection to a Nurse Call system.

	Feature	Description
4	Ethernet Port	Provides a network connection to Root using an RJ-45 cable.
5	USB Ports (2)	Provide USB 2.0 connectivity.
6	Power Entry Module	Contains the input connector for a hospital grade AC power cord and the fuse holder.
7	Equipotential Ground Connector	Provides electrical grounding for Root.
8	Iris Connectivity Ports (4)	Provide connection for standalone devices.

Side Views



Feature	Description
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	Feature	Description
1	System Status Lights	Provides an indication of alarms and system messages. See System Status Lights on page 63.
2	Power Button	Places Root in Power On, Standby and Power Off modes.
3	MOC-9 Ports (3)	Provide connectivity for MOC-9 modules.

Chapter 2: Setting Up

Unpacking and Inspection

To unpack and inspect Root

1. Remove Root from the shipping carton and examine it for signs of shipping damage or exposed electronics.
2. Check all materials against the packing list. Save all packing materials, invoice and bill of lading. These may be required to process a claim with the carrier.

If anything is missing or damaged, contact Masimo's Technical Service Department. See **Return Procedure** on page 91.

Guidelines for Setting Up

Root has a built-in bracket interface that allows it to be mounted on a pole or roll stand.

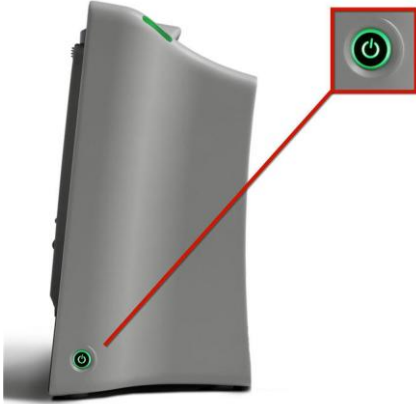
When setting up Root, follow these guidelines:

- Place on a stable, hard, flat and dry surface near the patient.
- Maintain a minimum of three (3) centimeters (one [1] inch) of free space around Root.
- Ensure that the back panel Speaker is not covered to avoid a muffled alarm sound.
- Charge Root's battery fully before use. See **Initial Battery Charging** on page 23.

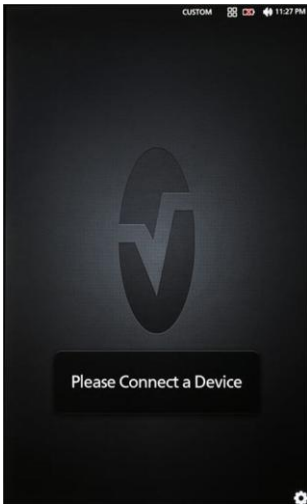
Root should not be operated outside the environmental conditions listed in the specifications section. See **Environmental** on page 79.

Power On

The Power Button can be used for Power On, Standby, and Power Off. To Power On, press the Power Button for two (2) seconds until a single audible tone sounds.






Once Root turns on, if no Radical-7 or MOC-9 module is connected, the Root display shows the following message: *Please Connect a Device*. The user is now able to connect Radical-7 and MOC-9 modules.



For information about Standby Mode and Power Off, See **Standby and Power Off** on page 65.

Initial Battery Charging

To charge the battery for the first time

1. Securely plug the AC power cord into power entry module.
2. Plug the hospital grade AC power cord into an AC power source.
3. Verify that Root's battery is charging by ensuring that the AC Power Indicator (1) is green and the Battery icon on the Status Bar (2) is solid green or has the charging symbol. See **AC Power Indicator** on page 63 and **About the Status Bar** on page 29.

(1)

(2)
4. The Root Charging Indicator remains orange while the battery is charging and will illuminate green when Root is fully charged. See **Battery Root** on page 47 and **About the Status Bar** on page 29.


See **Safety Information, Warnings, and Cautions** on page 11.

Radical-7 Connection

It is recommended that Root be powered on before performing the steps below.

- Snap the Radical-7 into the Docking Station.
- If the Radical-7 is not yet turned on, press the power button on the Radical-7 to power it on.
- When properly connected, the Radical-7 Charging Indicator light will illuminate. An illuminated Radical-7 Battery icon will also appear in the Status Bar.
- Root display will show active measurements and parameters.



For Radical-7 charging conditions, see **Radical-7 Charging Indicator** on page 64.

Nurse Call Connection Port

Use a Nurse Call connection cable to connect to a Nurse Call System.



To connect to a Nurse Call System

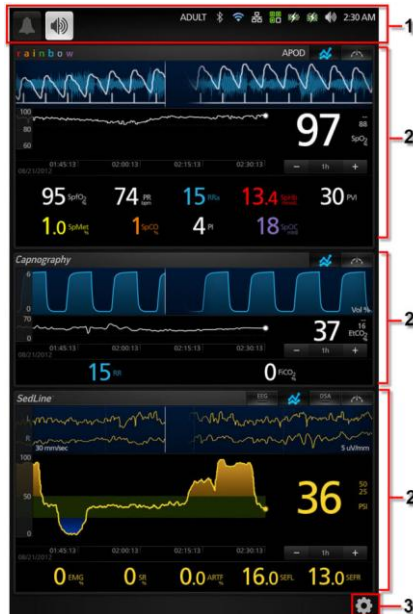
1. Identify the Nurse Call connection end (1/4 inch round female connector) of the cable.
2. Insert the Nurse Call connection cable securely into the compatible port on Root.
3. Depending on the connection type of the Nurse Call System, it may be necessary to orient the other end of the Nurse Call connection cable to fit correctly into the system connection.
4. For more information, see **Device Output** on page 51.

Chapter 3: Operation

The information in this chapter assumes that Root is set up and ready for use. This chapter provides necessary information for proper operation of the device. Do not operate Root without completely reading and understanding these instructions.

About the Main Screen

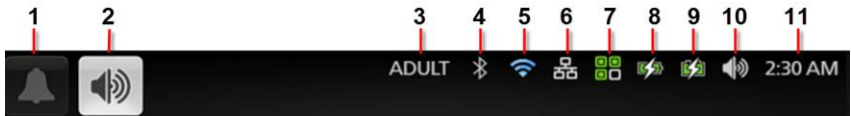
The Main Screen consists of several features. The following shows the Main Screen when three different technologies are connected, Radical-7 (top) showing rainbow® parameters and measurements, Phasein module (middle) showing capnography measurements and SedLine module (bottom) showing brain function measurements.



Ref.	Feature	Description
1	Status Bar	Displays system status as well as icons that provide shortcuts to menu items or actions. See About the Status Bar on page 29.
2	Windows	Provides a dynamic, user-configurable display area for all the data from Radical-7 or a MOC-9 module.
3	Main Menu icon	Provides access to the configuration options for Root, Radical-7 and MOC-9 modules. See Accessing Main Menu Options on page 43.

About the Status Bar

At the top of the Main Screen is the Status Bar with interactive icons. Each icon provides a shortcut to a menu item or an action on Root. An example is shown below.


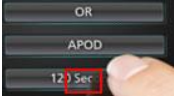









Ref.	Feature	Description
1	Alarm Silence	Displays alarm status and mutes all audible alarms for Root, Radical-7, and MOC-9 modules. See Alarm Silence on page 60.
2	Audio Pause	Displays Audio Pause status and temporarily silences an alarm event. See Audio Pause on page 62.
3	Profiles	Provides access to the <i>Profiles</i> screen. The example shown illustrates that Profiles is currently set to <i>Adult</i> for an adult patient. See Profiles on page 54.
4	Bluetooth	Provides access to the <i>Bluetooth</i> screen. If this icon is visible, then Bluetooth connectivity has been enabled. See Bluetooth on page 47.
5	Wi-Fi	Provides access to the <i>Wi-Fi</i> screen. If this icon is visible, then Wi-Fi connectivity has been enabled. The icon itself also indicates the strength of the wireless signal. See Wi-Fi on page 46.
6	Ethernet	Provides access to the <i>Ethernet</i> screen. If this icon is visible, then Ethernet connectivity has been enabled. See Ethernet on page 46.

Ref.	Feature	Description
7	Iris	<p>Provides access to the <i>Iris</i> screen. The example shown above indicates that standalone devices are connected to Ports 1, 2 and 3 and the information is being sent to Patient SafetyNet or Connectivity Gateway.</p> <p>The color of the icon matches the status colors of connected standalone devices on the Iris screen. See <i>Iris</i> on page 54.</p>
8	Radical-7 Battery	<p>Displays charging status for Radical-7 and provides access to the <i>Battery Radical</i> screen. The example shows that the battery is currently charging.</p> <p>See <i>Radical-7 Charging Indicator</i> on page 64.</p>
9	Root Battery	<p>Displays charging status for Root and provides access to the <i>Battery Root</i> screen. The example shows that the battery is currently charging.</p> <p>See <i>Root Charging Indicator</i> on page 64.</p>
10	Sounds	<p>Provides access to the <i>Sounds</i> screen to adjust alarm and pulse tone volume. This icon does not indicate the actual volume level of the alarm and pulse tone.</p> <p>See <i>Sounds</i> on page 57.</p>
11	Current Time	<p>Displays the current time and provides access to the <i>Localization</i> screen which contains settings related to local time, language and geography.</p> <p>See <i>Localization</i> on page 45.</p>

Using the Touchscreen Interface

Using the gestures described below, the user is able to customize the viewing experience, including displaying the highest priority parameters and measurements. The availability of navigation features is dependent on the connected Radical-7 and MOC-9 module(s).

Action	Illustration	Example	Description
Press			Touch and release. Action performed once finger is released.
Slide			Touch, move (left, right, up or down), and release. Moves an object across the display.
Swipe			Touch, move (left, right, up or down), and release quickly.
Pinch			Touch, move, and release via two touch points. Moving touch points apart zooms in, and moving them together zooms out.
Drag and Drop		See Customizing Windows on page 41.	Touch, hold, drag an object to desired position, and drop it by releasing.

Below is a list of all the different types of controls available on Root and the various ways to interact with each type of control.

Control	Applicable Actions	Description
Toggle	Slide knob	Switches between toggle states
	Press left or right of	Quickly moves knob left or right

Control	Applicable Actions	Description
	toggle	
Labeled Toggle	Slide knob	Switches between toggle states
	Press left or right of toggle	Quickly moves knob left or right
	Press label	Quickly moves knob left or right
Spinner	Press center (focused) tile	When closed, expands the spinner When open, collapses the spinner
	Swipe up or down	When open, scrolls through spinner tiles
	Press unfocused tile	When open, scrolls tile into center (focused) position
	Press anywhere outside spinner	When open, collapses spinner
Slider	Slide knob	Moves knob
	Press anywhere along slider path	Quickly moves knob to Tap position
Slider Spinner	Slide knob	Moves knob
	Press anywhere along slider path	Quickly moves knob to Tap position
	Press center (focused) tile	When closed, expands the spinner When open, collapses the spinner
	Swipe up/down	When open, scrolls through spinner tiles
	Press unfocused tile	When open, scrolls tile into center (focused) position

Control	Applicable Actions	Description
	Press anywhere outside spinner	When open, collapses spinner
Button	Press	Performs action (as defined by the button description)
Icon Menu	Press tile	Opens menu specified by tile
	Swipe left or right (anywhere)	Scrolls icons left or right
	Press bottom indicator icon	Quickly centers tile corresponding to indicator icon
Window	Press parameter or measurement	When no parameter or measurement alarm is present, opens parameter or measurement menu When parameter or measurement alarm is present, silences parameter or measurement alarm
	Press and hold	Enables parameter and measurement drag and drop
Well	Press parameter or measurement	When no parameter or measurement alarm is present, opens parameter or measurement menu When parameter or measurement alarm is present, silences parameter or measurement alarm
	Press and hold	Enables parameter and measurement drag and drop
Live Waveform	Swipe down	Separates pleth and acoustic waveforms
	Swipe up	Combines pleth and acoustic waveforms

Control	Applicable Actions	Description
Trend Line	Pinch in	Zooms in
	Pinch out	Zooms out
	Pan	Changes time range
	Press y-axis	Opens parameter or measurement trend menu
Trend Zoom	Press '+'	Increases time range
	Press '-'	Decreases time range
	Press time label	Resets time range to default
Alarm Silence icon	Press	Silences all alarms
Audio Pause icon	Press	Enables Audio Pause
Other Status Bar icons	Press	Opens relevant menu
Back Arrow	Press	Exits menu, abandons any changes

Menu Navigation

When navigating through menus and configuring settings, all changes must be confirmed by selecting **OK**. To cancel the changes, select **Cancel**. Any screen requiring selection of option(s) will time out after one (1) minute of inactivity and return to the Main Screen.



To navigate to the previous screen, press the arrow at the top left corner of the touchscreen.



To return to the *Main* Screen, at any time, press the **Home Button** at any time. The Home Button is always illuminated when Root is powered on.

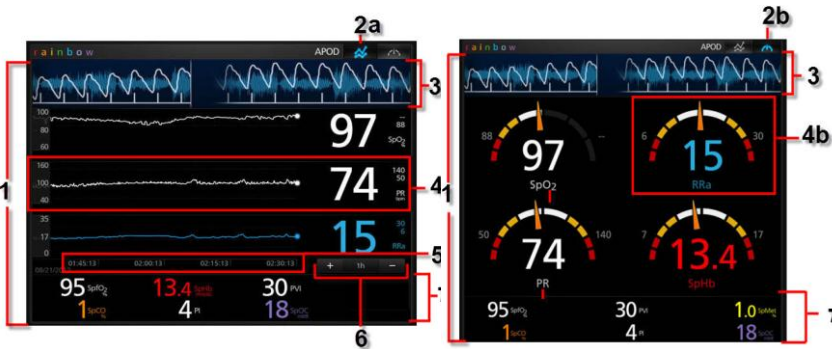


Understanding Windows

Root creates a Window for Radical-7 and every MOC-9 module connected. Parameters or measurements can be expanded or minimized within a Window to customize view. Radical-7 Windows are shown in the examples below.

Windows provide waveforms along with either a Trend View or an Analog View. Trend View displays each parameter or measurement alongside a graph of its values over time. Analog View displays values in relation to alarm ranges.

Details about the displayed information of parameters and measurements can be found in the instructions for use or operator's manual of Radical-7 and the appropriate MOC-9 module(s).




Trend View

Analog View

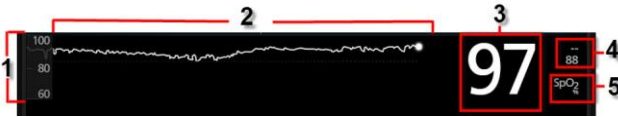
Feature	Description
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	Feature	Description
1	Window	The area where all data from a docked Radical-7 or connected MOC-9 module are displayed.
2a	Trend View icon	Select to see Trend View of the parameters and measurements, if supported.
2b	Analog View icon	Select to see Analog View of the parameters and measurements, if supported.
3	Waveform	Shows a parameter or measurement over time (only for Radical-7 and MOC-9 modules).
4a	Trend Display	(Available only in Trend View) Parameters and measurements are shown as Trend Displays in Trend View. A parameter or measurement's Trend Display includes its Value Range, Numeric Value, Alarm Limits and Parameter label. See Using Trend View on page 37.
4b	Analog Gauge	(Available only in Analog View) Parameters and measurements are shown as Analog Gauges in Analog View. A parameter's Analog Gauge includes its Alarm Limits, Numeric Value, Parameter Label, as well as Alarming, Caution and Normal Ranges. See Using Analog View on page 38.
5	Time Frame	(Available only in Trend View). Shows the amount of time the parameter or measurement has been monitored. Increase or decrease the time frame shown by using the pinch or spread gestures respectively.
6	Trend Zoom	(Available only in Trend View). Adjust the Time Frame by preset increments using the "+" and "-" buttons.
7	Well	Displays parameters and measurements which are not shown as Trend Displays or Analog Gauges.

Using Trend View

In Trend View, a parameter or measurement is displayed as a graph of its values over time. If a Window supports Trend View, then  (Trend View icon) displays in the upper right corner. Press the icon to view parameter or measurement data in Trend View.

The following diagram and table describe key features of a parameter's Trend Display in Trend View.




	Feature	Description
1	Value Range	Indicates current viewing of the parameter or measurement. Press to access the Trend menu where the minimum and maximum of the range can be modified.
2	Trend Line	Displays parameter and measurement over a period of time. Zoom in and out of a Trend Line by pinching out and in.
3	Numeric Value	Indicates current reading of the parameter or measurement.
4	Alarm Limits	Indicate high and low alarm limits for the parameter or measurement, if supported.
5	Parameter or Measurement Label	Indicates the name of the parameter or measurement.

Using Analog View

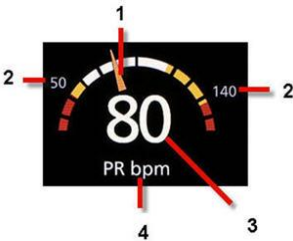
The Analog View shows parameter and measurement data as a needle pointing to graduations in a circular array around a dial. This view provides indications of change that can be interpreted at a quick glance.

Analog View displays alarming and normal ranges of a parameter or measurement. These indicators can be used to alert clinicians to a patient's condition. To understand specific parameters or measurements, refer to the instructions for use or operator's manuals for Radical-7 and the appropriate MOC-9 module(s).

If a Window supports Analog View, then  (Analog View icon) displays in the upper right corner. Press the icon to view parameter and measurement data in Analog View.

The following diagrams and tables describe key features of a parameter's Gauge in Analog View.

When alarm limits for a specific parameter or measurement are set, the corresponding Analog gauge re-oriens itself.



General features of the Analog View are:

Ref.	Feature	Description
1	Needle	Indicates current status of a parameter or measurement.
2	Alarm Limits	Indicate high and low alarm limits for the parameter or measurement.
3	Numeric Value	Indicates current reading of the parameter or measurement

Ref.	Feature	Description
4	Parameter or Measurement Label	Indicates the name of the parameter or measurement.



Specific ranges of the Analog View are:

Ref.	Feature	Color	Description
1	Normal Range	White	Area of the display range where an alarm will not be triggered.
2	Caution Range	Yellow	Area of the display range that provides a caution indicator.
3	Alarming Range	Red	Area of the display range where an alarm will be triggered.

Some ranges display as quarter circles, others display as half circles. A quarter circle displays when the value has a physiologic normal level at one end of the range. A half circle displays when the value has a physiologic normal level in the middle of the display range.

In the example below, the SpO2 gauge is shown as a quarter circle, where values lower than 88% will trigger an alarm, and the PR gauge is shown as a half circle, where values below 50 bpm and above 140 bpm will trigger an alarm.



Quarter Circle

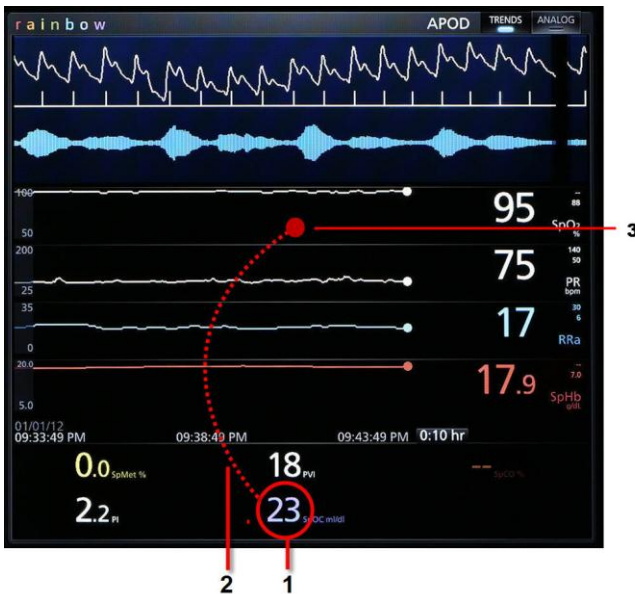


Half Circle

Customizing Windows

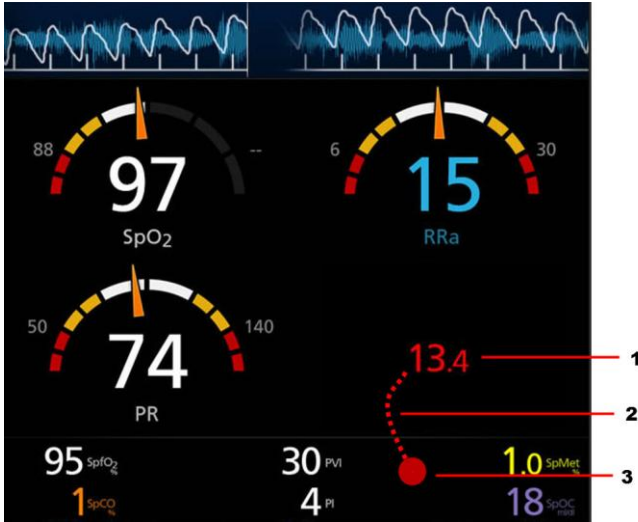
Windows can be customized by expanding and minimizing parameters and measurements in both Trend View and Analog View. When a parameter is minimized, it is only displayed the Well with its Numeric Value and Parameter Label. When a parameter is expanded, it will be shown as either a Trend Display or Gauge.

To expand a parameter or measurement



Order	Instruction
Step 1	Press and hold the Numeric Value until it dims.
Step 2	Drag the Numeric Value over any Trend Display.
Step 3	Release the Numeric Value.

Minimizing a parameter or measurement



Order	Instruction
Step 1	Press and hold the Numeric Value until it shrinks.
Step 2	Drag the Numeric Value to the Well.
Step 3	Release the Numeric Value.

Accessing Main Menu Options

To access the Main Menu options

At the bottom right corner of the touchscreen, press the **Main Menu icon**.



The Main Menu options are:



Device Settings

See *Device Settings* on page 44.



About

See *About* on page 53.



Trend Settings

See *Trend Settings* on page 53.



Profiles

See *Profiles* on page 54.



Iris

See *Iris* on page 54.



Layout

See *Layout* on page 55.



Sounds

See *Sounds* on page 57.

Device Settings



The *Device Settings* menu allows the user to view and customize settings for Root.

The Device Settings options are:



Localization

See *Localization* on page 45.



Wi-Fi

See *Wi-Fi* on page 46.



Ethernet

See *Ethernet* on page 46.



Bluetooth

See *Bluetooth* on page 47.



Battery Root

See *Battery Root* on page 47.



Battery Radical

See *Battery Radical* on page 48



Brightness

See *Brightness* on page 49.



Access Control

See *Access Control* on page 50.



Device Output

See *Device Output* on page 51.

Localization



Use the Localization screen to view the current date and time and configure settings related to local time, language and geography. The user can also access the *Localization* screen by pressing the current time on the Status Bar. See **About the Status Bar** on page 29.

Option	Description	Factory Default Setting	Configurable Settings
Language	Selects the language display for Root.	English	Choose from available languages.
Date Format	Sets the display format for current date.	mm/dd/yy	mm/dd/yy or dd/mm/yy
Time	Sets the display format for current time.	12 hour	12 hour or 24 hour
Line Frequency	Sets to match regional power line frequency.	60 Hz	50 Hz or 60 Hz
Date	Sets the current date.	N/A	N/A
Time	Sets the current time.	N/A	N/A

Wi-Fi



Use the Wi-Fi screen to enable or disable Wi-Fi connectivity. When Root is connected to a Wi-Fi network, the Wi-Fi icon on the Status Bar conveys the strength of the connection. See ***About the Status Bar*** on page 29.

Option	Description	Factory Default Setting	Configurable Settings
Wi-Fi	Enables or disables Wi-Fi connectivity.	Off	On or Off
Additional fields in the <i>Wi-Fi</i> screen display read-only settings about the Wi-Fi connection that cannot be configured by the user.			

Your Masimo sales representative can provide necessary information regarding an initial Wi-Fi connection.

Ethernet



Use the Ethernet screen to enable or disable Ethernet connectivity. When Ethernet connectivity is enabled, the Ethernet icon will appear in the Status Bar. See ***About the Status Bar*** on page 29.

Option	Description	Factory Default Setting	Configurable Settings
Ethernet	Enables or disables Ethernet connectivity.	On	On or Off
Additional fields in the Ethernet screen display read-only settings about the Ethernet connectivity that cannot be configured by the user.			

Bluetooth



Use the Bluetooth screen to enable or disable Bluetooth connectivity. When Bluetooth connectivity is enabled, the Bluetooth icon will appear in the Status Bar. See **About the Status Bar** on page 29.

Option	Description	Factory Default Setting	Configurable Settings
Bluetooth	Enables or disables Bluetooth connectivity.	Off	On or Off

Battery Root



Use the Battery Root screen to view the specific percentage of charge on the battery. The user can also access Root's Battery screen by pressing the Battery icon on the Status Bar. See **About the Status Bar** on page 29.

Option	Description
State of Charge	Provides a read-only display of battery level remaining.
Battery Diagnostics	Allows trained personnel to access battery diagnostic information

Battery Radical



Use the Battery screen to view the specific percentage of charge on the Radical-7's battery. The user can also access the Battery screen by pressing the Radical-7's Battery icon on the Status Bar. See ***About the Status Bar*** on page 29.

Option	Description
State of Charge	Provides a read-only display of battery level remaining.
Battery Diagnostics	Allows trained personnel to access battery diagnostic information

Brightness



Use the Brightness screen to adjust the brightness of the Root display.

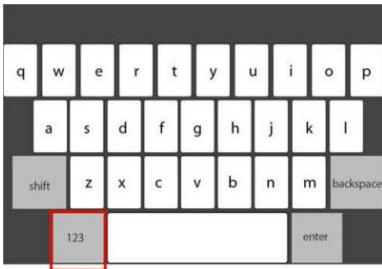
Option	Description	Factory Default Setting	Configurable Settings
Auto Brightness	Allows automatic adjustment of Root's display brightness based on ambient light.	Off	On or Off
Brightness	Adjust the brightness level of the Root display by sliding the button (4 is brightest).	4	1, 2, 3, 4


Access Control



Access Control contains configurable options and settings that require a password.

To enter Access Control



1. Press the  key.
2. When the numeric screen displays, enter the following numbers: **6 2 7 4**
Asterisks (****) will be displayed.
To undo an entry, press **Backspace**.
3. Press **Enter** to access the password protected screen.

Note: The password will have to be entered every time this screen is accessed.

Option	Description	Factory Default Setting	Configurable Settings
All Mute Enabled	Enable parameter Alarm Silence menu option. See Sounds on page 57.	Off	On or Off
Lock Alarm Volume	Sets the lowest alarm volume level.	Off	3, 4, or Off
Save as Adult	Saves current profile parameter as the Adult Profile.	N/A	Press Save to load.

Option	Description	Factory Default Setting	Configurable Settings
Save as Pediatric	Saves current profile parameter as the Pediatric Profile.	N/A	Press Save to load.
Save as Neo	Saves current profile parameter as the Neonatal Profile.	N/A	Press Save to load.
Factory Defaults	Options are restored to factory values.	N/A	Press Restore .

Device Output



Device Output configures the Nurse Call feature on Root.

A Nurse Call can be triggered based on alarm, low Signal IQ events or both. In addition, Nurse Call Polarity can be inverted to accommodate local Nurse Call station requirements.

Option	Description	Factory Default Setting	Configurable Settings
Nurse Call Polarity	Controls the mechanism of action for triggering to occur. Should be changed to accommodate institutional Nurse Call settings.	Normal	Normal or Inverted
Nurse Call Trigger	Controls the source of monitoring which sets off the trigger.	Alarms	Alarms, Signal IQ Alarms and Signal IQ

Note: The Nurse Call feature is disabled when Audio Pause is enabled and Nurse Call Trigger is set to *Alarms*. For more information about Audio Pause, see **Audio Pause** on page 62.

About



Use the *About* screen to view the serial number as well as software and hardware version information about Root. These details may be helpful during troubleshooting.

Option	Description
Serial Number	Displays the serial number for the device.
MCU 1	Displays software version number.
Processor	Displays processor version number.
MCU 2	Displays software version number.

Information about Radical-7 and MOC-9 modules will display in a separate list. These fields are read-only and cannot be configured by the user.

Trend Settings



Use the Trend Settings screen to configure trend viewing on the Main Screen and trend data storage on Root.

Option	Description	Factory Default Setting	Configurable Settings
Default Duration	Duration captured by Trend Lines.	2 hours	15, 30, 45 minutes 1, 2, 4, 8, 12, 24 hours
Clear Trends	Delete all stored trend data.	N/A	Press Clear to delete all stored trend data.

To configure trend settings of specific parameters and measurements, refer to the instructions for use or operator's manuals for Radical-7 and appropriate MOC-9 module(s).

Profiles



Use the Profiles screen to select patient type.

Option	Description	Factory Default Setting	Configurable Settings
Patient Type	Identifies the Profiles setting in the device.	Adult	Adult, Pediatric, Neonatal

Root can be configured for various patient types by using the Profiles feature. Profile selection controls the management of patient configuration settings on Root. The settings of the three default profiles (Adult, Pediatric, and Neonatal) configure parameter alarms, averaging time, and sensitivity modes.

Custom profiles can also be created to accommodate usage in any hospital care area. See the Masimo Instrument Configuration Tool Directions for Use for information on adding Profiles.

For more information regarding Profiles, see the instructions for use or operator's manuals for Radical-7 and appropriate MOC-9 module(s).

Iris



The status of the four (4) Iris Connectivity Ports as well as the connection type (for example, monitor, pump, ventilator) will be displayed on the Iris Status screen. See ***Iris Status Screen*** on page 71.

Layout



Use the Layout screen to select sizing options for Windows and Trend Displays.

Additional Settings

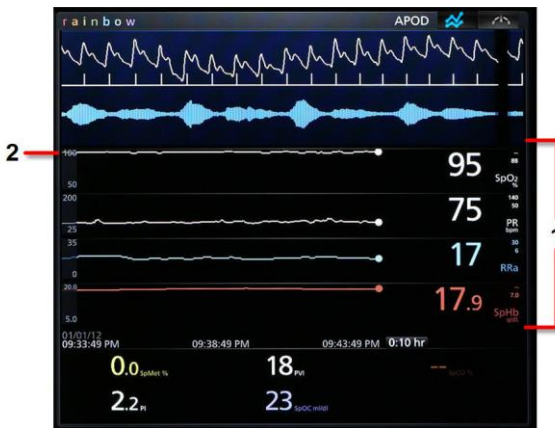


There are different ways to display the parameters and measurements by changing the Layout Style.

Note: This feature only applies to Trend View. See *Using Trend View* on page 37.

Option	Description	Factory Default Setting	Configurable Settings
Layout Style	Controls the sizing of Trend Displays.	Fixed	Fixed or Dynamic

The following diagram and tables explain the differences between Fixed and Dynamic modes for a Trend View.



Fixed

Ref.	Description
1	A set number of Trend Displays can be shown at the same time and all Trend Displays are fixed in size. Every additional parameter or measurement expanded will replace an existing Trend Display. For more information about expanding parameters, see Customizing Windows on page 41.
2	Size of each Trend Display is fixed.

Dynamic

Ref.	Description
1	Size of all Trend Displays decreases or increases to accommodate parameter(s) expanded or minimized. All Trend Displays are always evenly sized.* . For more information about expanding and minimizing parameters, see Customizing Windows on page 41.
2	*Size of each Trend Display is automatically adjusted.

**When the number of Trend Displays reaches maximum viewing capacity, additional parameters expanded will result in the replacement of existing Trend Displays.*

Available Layout



When only Radical-7 or a single MOC-9 module is connected to Root, the Available Layout will be 100%. When Radical-7 and/or multiple MOC-9 modules are connected, the user will have the option to select from several pre-configured layouts.

Sounds



Use the Sounds screen to control the volume level of sounds and duration of audio pause for Root.

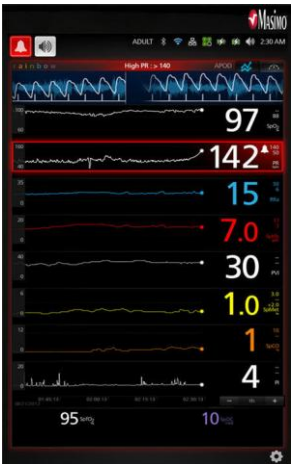
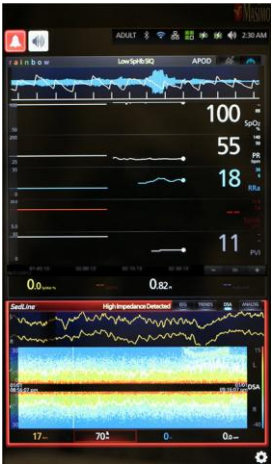
Option	Description	Factory Default Setting	Configurable Settings
Alarm Volume	Sets the alarm volume level.	Highest volume	Slide towards the left to decrease volume to silence.
Pulse Tone Volume	Sets the pulse tone volume level.	Highest volume	Slide towards the left to decrease volume to silence.
Audio Pause Duration	Sets the length of time that the audible alarm remains silenced, when Audio Pause is enabled. See Audio Pause on page 62.	2 minutes	1, 2, 3 minutes, Permanent*, Permanent with Reminder*. If <i>Permanent</i> is selected, there will be no audible alarms, but visual alarms will still display. If <i>Permanent with Reminder</i> is selected, a tone will sound every three (3) minutes as a reminder that <i>Permanent</i> is active.


*Requires user to have All Mute Enabled (Permanent Silence Duration) in the Access Control menu. See **Access Control** on page 50.

Alarm Interface

Alarms can have different priority levels and come from different sources. The following tables describe alarm behaviors in more detail.

Priority	Alarm Sound
1	Five (5) beeps: beep-beep-beep, <i>brief pause</i> , beep-beep
2	Three (3) beeps: beep-beep-beep

Alarm Source	Example	Explanation
Parameter Level		<p>The example shown here is a PR alarm as the reading (142) exceeds the upper alarm limit (140). Note that the borders of both the PR Trend Display as well as the Window are illuminated red, and the explanation of the alarm is shown at the top of the Window (High PR > 140).</p>
Window Level		<p>The example shown here is a "High Impedance" alarm in the lower Window.</p> <p>Note that the border of the Window illuminates red, and the explanation of the alarm is shown at the top of the Window (High Impedance Detected).</p>


Alarm Source	Example	Explanation
System Level		<p>The example shown here is a "Low Battery" alarm. Note that the border of the entire Root display is illuminated red, and the explanation of the alarm is shown in the Status Bar (Low Battery).</p>




For more details about specific alarms on Radical-7 and MOC-9 modules, refer to the instructions for use or operator’s manuals for Radical-7 and MOC-9 modules.

Alarm Silence

The Alarm Silence icon is an indicator as well as a functional button. It always indicates the presence of alarms, and it can be used to temporarily suspend audible alarms for a pre-configured amount of time, known as Silence Duration.

Silence Duration configurations vary across different parameters and measurements. For more information about Silence Duration, refer to the instructions for use or operator’s manuals for Radical-7 and appropriate MOC-9 module(s).

Icon Appearance	Description	Visual Alarms
	<p>There are currently no active alarms, and no alarms have been silenced.</p>	<p>No</p>

Icon Appearance	Description	Visual Alarms
	<p>There are currently no active alarms, but at least one alarm has been and is still silenced.</p>	<p>No</p>
	<p>There is currently at least one active alarm that has not been silenced.</p>	<p>Yes</p>
	<p>There is currently at least one active alarm, but all active alarms are silenced.</p>	<p>Yes</p>

Audio Pause

Audio Pause temporarily suspends all audible alarms on Root. When it is active, visual alarms are not impacted and will still display. The Audio Pause icon is located on the left side of the Status Bar – do not confuse with the Sounds icon on the right side of the Status Bar.

By default, Audio Pause is inactive, and the icon appears in the following way:



Audio Pause inactive

To activate Audio Pause, press the icon. It will turn red and the remaining Audio Pause Duration time counts down next to the icon. The default duration for Audio Pause is 120 seconds. In the example below, Audio Pause is activated, and there are 117 seconds left until Audio Pause is inactivated again.

To configure Audio Pause, see **Sounds** on page 57.



Audio Pause active. 117 seconds until Audio Pause is inactive.

Note: When Audio Pause is activated, powering off and then powering on Root will return Audio Pause to its default inactive state.

Trend Download

Root can store up to 96 hours of trend data captured at 2-second intervals from Radical-7 and MOC-9 modules. Trend data from Root can be transferred to a computer via USB for evaluation.

Trend data is stored in non-volatile memory, so it is not erased when Root is shut off. Trend data download is initiated using the Masimo Instrument Configuration Tool, which converts the data to a .TXT or .CSV file.

Lights

System Status Lights

The System Status Lights provide visual indications of alarms and system messages. The lights will illuminate in different colors depending on the state of the device.

To locate the System Status Lights, see **Side Views** on page 19.

System Status Light

Light Status	Alarm Priority	Indication
None	None	Monitoring has not begun.
Green	None	There is currently no active alarms.
Yellow	Low	There is an active alarm of low priority.
Red	High	There is an active alarm of high priority.

The alarm priority is determined by the Radical-7 and MOC-9 module(s) that are connected to Root. The following are system level alarm messages that accompany System Status Lights when Radical-7 and MOC-9 modules are not connected:

Status Light Message	Alarm Priority
Low battery	Low
Service required	High

AC Power Indicator



Whenever Root is connected to an AC power source, this light will illuminate:

Light Status	Indication
Green	Root is connected to an AC power source.
Off	Root is not connected to an AC power source.

Root Charging Indicator



Whenever Root is connected to an AC power source, if not fully charged, its battery will charge.

Light Status	Battery Indication
Green	Battery is fully charged.
Orange	Battery is charging.
Red	Battery charging error.
Off	Battery is not being charged. Root is not connected to AC power source.

Radical-7 Charging Indicator



When Root is connected to an AC power source, it is able to charge a correctly docked Radical-7. This is true, whether Radical-7 is powered on, in Standby Mode, or powered off. Conversely, when Root is not connected to AC power, it will not charge the Radical-7.

The light status provides a visual indication of the battery condition:

Light Status	Battery Indication
Green	Battery is fully charged.
Orange	Battery is charging.
Red	Battery is unable to charge.
Off	Battery is fully charged, not being charged.

Standby and Power Off

To put Root in the Standby Mode or Power Off, follow these steps:

State	Description
Standby Mode	<p>Press and hold the Power Button for two (2) seconds until one (1) audible tone sounds.</p> <p>Standby Mode conserves power while enabling a quicker startup sequence.</p>
Power Off	<p>Press and hold the Power Button for eight (8) seconds, until two (2) audible tones sound. The Home Button will flash, and the Power Button will flash orange.</p> <p>Power Off completely shuts down Root and results in a longer startup sequence.</p>

Chapter 4: MOC-9

Flexible measurement expansion is enabled through MOC-9. It can display parameters and measurements captured by third-party technologies in an all-in-one view on Root.

When any MOC-9 module is connected, Root automatically creates a Window that displays all the data from that module. The example below shows the “SedLine” and “Capnography” Windows which display data from the SedLine brain function monitoring and Phasein capnography MOC-9 modules that are connected to Root.



MOC-9 Ports

Use a MOC-9 cable to connect other MOC-9 modules to Root.



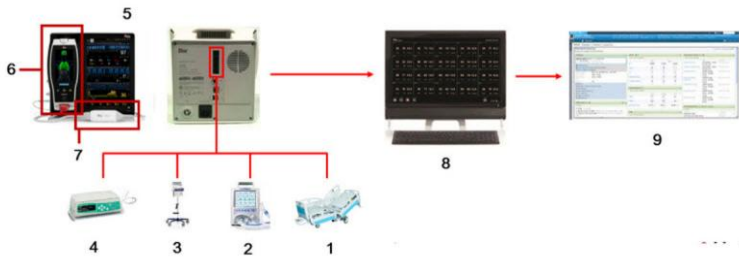
To use an MOC-9 Port

1. Identify the MOC-9 end of the cable.
2. Orient the cable to fit correctly into an MOC-9 Port.
3. Insert the MOC-9 cable securely into any of the three (3) compatible ports on Root.

Chapter 5: Iris

Iris allows a variety of standalone devices to connect to Root. Patient data can be passed through Root to Patient SafetyNet or Connectivity Gateway, which can send the data to electronic health records.

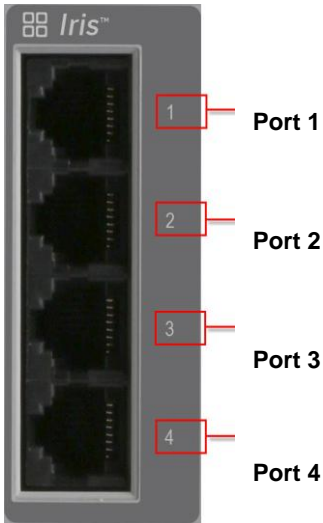
Below is an example of one way Root can be used in a network setting using Patient SafetyNet. Root receives and may display information from Radical-7, MOC-9 modules, as well as standalone devices.



Ref.	Description
1 - 4	Standalone devices connected via Iris (e.g., monitor, pump, ventilator)
5	Root
6	Radical-7
7	MOC-9 modules
8	Patient SafetyNet or Masimo Connectivity Gateway
9	Electronic Health Records system

Iris Connection Ports

Use Iris Adapters and RJ-45 cables to connect standalone devices to Root.

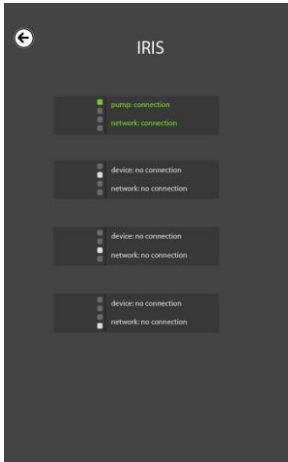


To connect a standalone device via an Iris Connectivity Port:

1. Connect the RS-232 end of the Iris Adapter to the standalone device.
2. Connect the RJ-45 end of the Iris Adapter to any of the four (4) compatible Iris Connectivity Ports on Root using a RJ-45 cable.


Iris Status Screen

Information about Iris Connectivity Ports are displayed on this screen, which is accessible by selecting the Iris option on the Main Menu.



Connection Status Color	Description of Connection
Green	Standalone device is successfully connected to Root, and Root is successfully connected to a Patient SafetyNet or Connectivity Gateway.
Yellow	Standalone device is successfully connected to Root; however, Root is not successfully connected to a Patient SafetyNet or Connectivity Gateway.
Gray	No standalone device is connected to the Iris Connectivity Port.

Additionally, the Ports are also mapped to the Iris icon on the Status Bar. When a standalone device is connected to Root via one of the Ports, the corresponding part of the icon will be lit green or yellow. In the example below, a standalone device is connected to Iris Connectivity Port 1.

Port 1 (connected)  Port 2

Port 3

Port 4

Status and connection type are read-only and not configurable by the user. For more information on Iris connectivity, refer to the instructions for use or operator's manual for the appropriate version of Masimo Patient SafetyNet.

Chapter 6: Messages

The following messages are specific to Root:

Message	Explanation	Next Step
Battery Charge is Low.	The internal battery needs to be charged. System Status Lights flash yellow.	Charge Root's battery using AC power.
MOC-9 module disconnected (e.g. SedLine Disconnected)	A MOC-9 module is disconnected from Root.	Reconnect module or acknowledge message by pressing the Alarm Silence icon.
Radical-7 Disconnected	Radical-7 is disconnected from Root.	Reconnect Radical-7 or acknowledge message by pressing the Alarm Silence icon.

For additional messages, refer to the instructions for use or operator's manuals for Radical-7 and MOC-9 modules.

Chapter 7: Troubleshooting

Troubleshooting Radical-7 and MOC-9 Modules

For information on troubleshooting values that are provided from Radical-7 and MOC-9 modules refer to their respective instructions for use or operator's manuals.

Troubleshooting Root

Symptom	Possible Cause	Correction
Root does not turn on.	Power Button not pressed long enough.	Press Power Button for two (2) seconds.
	The battery may be depleted.	Connect Root to AC power to charge battery.
	One of the fuses is not operating properly.	Replace the fuse. See Replacing the Fuses on page 88.
Root turns on, but Main Screen is dim or blank.	The brightness setting is not correct.	Adjust the brightness setting. See Brightness on page 49. If the condition persists, Root requires service. Contact Masimo Technical Support. See Return Procedure on page 91.
Touch functionality is not responsive	Internal Failure	Root requires service. Contact Masimo Technical Support. See Return Procedure on page 91.
Not displaying data from Radical-7 or MOC-9 modules.	Connection error.	Ensure that the connections are securely in place and properly plugged in, or that the cable is not defective.

Symptom	Possible Cause	Correction
Iris screen does not display connection status for standalone devices.	Connection error	Unplug and replug the Iris Adapter.
Iris screen does not display connection status for standalone devices.	Connection error.	If the problem persists, refer to instructions for use or operator's manual for the connected standalone devices or Iris section of the instructions for use or operator's manual for the appropriate version of Patient SafetyNet.
Root has a continuous speaker tone.	Internal failure.	To silence an alarm, press the Power Button for eight (8) seconds. If alarm continues to sound, Power Off Root. Root requires service. See Return Procedure on page 91.
Power Button does not respond when pressed.	Power Button may need to be pressed for a longer time.	To Power On when turned off or in Standby Mode, press Power Button for two (2) seconds. To Power Off when turned on or in Standby Mode, press the Power Button for eight (8) seconds.
	Internal failure.	Root requires service. See Return Procedure on page 91.
Home Button does not work when pressed.	Internal failure.	Root requires service. See Return Procedure on page 91.
Battery does not charge.	AC power cable may be disconnected.	Unplug and replug AC power cable.

Symptom	Possible Cause	Correction
Root Charging Indicator illuminates red.	Internal failure.	Root requires service. See Return Procedure on page 91.
Nurse Call does not communicate.	Connection error	Unplug and replug Nurse Call connector. See Nurse Call Setting Connections on page 88.

Chapter 8: Specifications

This chapter contains specifications of Root.

For information on the specifications of Radical-7, MOC-9 modules, and standalone devices, refer to their respective instructions for use or operator's manuals.

Electrical

Root	
AC Power requirements	100-240 VAC~, 47-63 Hz, 65 W (Max)
Fuses (2)	2 Amp, Fast Acting, Metric, (5x20mm), 250V
Battery	
Type	10.8V Lithium Ion (Nominal)
Capacity	4 hours*
Maximum Charging Time	4 hours

*This represents approximate run time at the lowest brightness, using a fully charged battery.

Environmental

Root	
Operating Temperature	32°F to 122°F (0°C to 50°C)
Transport/Storage Temperature	-40°F to 158°F (-40°C to 70°C)
Operating Humidity	10% to 95%, non-condensing
Storage Humidity	10% to 95%, non-condensing

Operating Altitude	500 mbar to 1060 mbar -1000 ft to 18,000 ft (-304 m to 5,486 m)
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Display

Characteristic	Description
Type	Backlit Active Matrix TFT LCD
Resolution	1280 x 800 pixels
Size	10.1 in (25.65 cm) Diagonal
Color	24 bit RGB

Touchscreen

Characteristic	Description
Type	Multi-Touch P-Cap

Alarms

Visual Alarm Priority	System Status Light Color
High	Red
Low	Yellow

Nurse Call Specifications

The Nurse Call relays have the following electrical specifications per switch:

Parameter	Specification
Max Voltage	36 VDC or 24 VAC peak

Connectors

Connector	Type	Number of Ports
Ethernet	10/100 MBps	1
Nurse Call	1/4 inch round female	1
MOC-9	Masimo Connector	3
USB	USB 2.0	2
Iris	RS-232/RJ-45	4

Communication Specifications

Communication	
Type	Description
WLAN Radio	Tri Mode IEEE 802.11 a/b/g
Security and Authentication	
Encryption	64/128-bit WEP, Dynamic WEP, WPA-TKIP, WPA2-AES

Authentication	Open System, Shared Key, Pre-Shared Key (PSK), 802.1X: LEAP, PEAP< TTLS, TLS, EAP-FAST
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Applicable Standards and Regulations








Software Compliance
EN 60601-1-4:1996 + A1: 1999
EMC Compliance
EN 60601-1-2, Class A device
ISO 9919, Clause 36 20 V/M radiated immunity
Protection from Ingress of Liquids
IPX1 per IEC 60529
Electrical and Mechanical Safety
UL 60601-1: 2003
CAN/CSA 22.2 No. 601.1: 2005
IEC 60601-1 / UL 60601-1: 1988 + A1: 1991 + A2: 1995
EN 60601-1: 1990 + A1: 1993 + A2: 1995
ISO 9919:2005
Type of Protection
Class I (on AC power)
Internally powered (on battery power)





Compatibility Standards	
USA	FCC ID: VKF-RDS7 Model - RDS-7: FCC parts 15.207, 15.209, 15.247, and 15.407
Canada	IC:7362A-RDS7 IC Model: RDS-7 RSS-210
Europe R & TTE Directive	EN 3000 328, EN 301 893, EN 301 489-17





Symbols

The following symbols are found on Root or its packaging and are defined below. Some of the interfaces and symbols are not available on all versions.

Symbols	Definition
	Caution, consult accompanying documents
	Manufacturer
	Date of Manufacture
	Non-ionizing electromagnetic radiation
IPX1	IPX1 Protection against liquid drops falling vertically
Rx ONLY	Federal (USA) law restricts this device to sale by or on the order of a physician
	UL, LLC, certification

Symbols	Definition
	WEEE Compliant
	Storage temperature limitation Storage altitude limitation
	Storage Humidity Limitation
	Keep dry
	Fragile, handle with care
	Fuse replacement
	Equipotential ground terminal

Symbols	Definition
	Federal Communications Commission (FCC) licensing
FCC ID, IC, IC Model	Identifies unit has been registered as a radio device
	Mark of conformity to European Medical Instrument Directive 93/42/EEC
	Authorized representative in the European community
	Wireless features can be used in member states with the restriction of indoor use in France

Symbols	Definition
	Iris Connection
	USB port
	AC Current
	Nurse Call interface

Chapter 9: Service and Maintenance

This chapter contains information about cleaning, battery operation, performance verification, service, repair and warranty.

Cleaning

Root is a non-sterile and reusable device.

To surface clean, wipe down the outer surface of Root using any of the following solvents:

- Cidex Plus (3.4% glutaraldehyde)
- 10% bleach solution
- 70% isopropyl alcohol solution

Do not allow liquids to enter the interior of Root. Using the recommended cleaning solutions on the touchscreen will not affect the performance of Root.

Replacing the Fuses

Should a power-related problem cause one or both of the fuses to fail, the fuse(s) will need to be replaced. The fuses are 1 amp, metric, fast-acting, 5x20mm, 250V.

The fuses can be removed by hand or with a 5-millimeter or 3/16-inch screwdriver.

To replace the fuse(s)

1. Power Off Root completely. Do not put in Standby Mode. See **Standby and Power Off** on page 65.
2. Remove the AC power cord from the Power Entry Module in the back panel.
3. Remove the fuse holder by pulling it forward from the Power Entry Module.
4. Remove a fuse by gently pulling the top of the fuse away from the center and then pulling up. The fuse should easily be removed. Do not force.
5. Place a new fuse in the fuse holder.
6. If replacing both fuses, repeat steps 4 and 5 for the second fuse.
7. Slide the fuse holder back into the Power Entry Module and press firmly to make sure it is secure.

Root is ready to be reconnected to AC power. If the fuses fail shortly after replacement, Root requires service. See **Repair Policy** on page 90.

Power-On Self Test

To conduct a Power-On Self Test

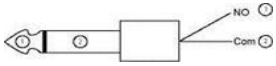
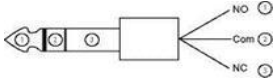
1. Connect Root to AC power, and verify that the AC Power Indicator is illuminated.
2. Power On Root. Within five (5) seconds, all available indicators will illuminate, the device will emit a tone, and the Masimo logo will display.

Nurse Call Setting Connections

For maximum flexibility, either normally open or normally closed signals are available. During an alarm condition or a low Signal IQ event, depending on the configuration of the device output, the normally open pin will be connected to the common pin and the normally closed pin will be

disconnected. In addition, the Nurse Call Polarity can be inverted to accommodate various nurse call station requirements.

Only qualified personnel should connect one of these two signals to a hospital's Nurse Call system.

Cable Description	Nurse Call Event	Menu Setting
	2 contacts normally opened	Nurse Call Polarity Normal
	2 contacts normally closed	Nurse Call Polarity Inverse
	1 and 2 contacts normally opened 2 and 3 contacts normally closed	Nurse Call Polarity Normal
	1 and 2 contacts normally closed 2 and 3 contacts normally opened	Nurse Call Polarity Inverse
	1 and 2 contacts normally closed 2 and 3 contacts normally opened	Nurse Call Polarity Inverse

Battery Test

To conduct a Battery Test

1. Fully charge Root by connecting it to AC power.
2. Verify that the Root Charging Indicator is illuminated.
3. When Root is fully charged, the Root Charging Indicator turns off.
4. Power On Root and verify that the Root Battery Indicator icon on the Status Bar shows a full charge.

Repair Policy

Masimo or an Authorized Service Provider must perform warranty repair and service. Have the malfunctioning device repaired.

Clean a contaminated and/or dirty device before returning, following the cleaning procedure described in **Cleaning** on page 87. Make sure the device is fully dry before packing.

For information on returning the device for service, see **Return Procedure** on page 91.

Return Procedure

Clean a contaminated or dirty device before returning, following instructions in **Cleaning** on page 87. Make sure the device is fully dry before packing. For customers in the United States, contact Masimo Technical Services at 800-326-4890 (select option 2) to obtain support and a RMA number (if required). All customers can also visit <http://service.masimo.com> for Technical Services contact information for their region.

Package the device securely, in the original shipping container if possible, and enclose or include the following information and items:

- If provided, include the RMA form supplied by Masimo Technical Services.
- Warranty or extended warranty information and a copy of the invoice or other applicable documentation must be included.
- Purchase order number to cover repair if the device is not under warranty, or for tracking purposes if it is.
- Ship-to and bill-to information.
- Contact information (name, telephone/fax number, and country) for any questions about the repair.
- A certificate stating the product has been decontaminated for bloodborne pathogens.

Return the product to the shipping address given by Masimo Technical Services.

Contacting Masimo

To contact Masimo, refer to the following:

USA, Canada, and Asia Pacific	Europe	All Other Locations
Masimo Corporation 40 Parker Irvine, California 92618 USA Tel:+1 949 297 7000 Fax:+1 949 297 7001	Masimo International Sàrl Puits-Godet 10 2000 Neuchatel- Switzerland Tel:+41 32 720 1111 Fax: +41 32 724 1448	Contact your local Masimo Representative

Sales & End-User License Agreement

This document is a legal agreement between you (“purchaser”) and Masimo Corporation (“Masimo”) for the purchase of this Product (“Product”) and a license in the included or embedded Software (“Software”) except as otherwise expressly agreed in a separate contract for the acquisition of this Product, the following terms are the entire agreement between the parties regarding your purchase of this Product. If you do not agree to the terms of this agreement, promptly return the entire Product, including all accessories, in their original packages, with your sales receipt to Masimo for a full refund.

Warranty

Masimo warrants to the initial Purchaser for a period of one (1) year from the date of purchase that: (i) each new Product and the Software media as delivered are free from defects in workmanship or materials, and (ii) the Product and Software will perform substantially as labeled in the directions for use. Masimo’s sole obligation under this warranty is to repair or replace any Product or Software that is covered under warranty.

Batteries are warranted for six (6) months.

To request a replacement under warranty, Purchaser must contact Masimo for a returned goods authorization. If Masimo determines that a Product must be replaced under warranty, it will be replaced and the cost of shipment covered. All other shipping costs shall be the responsibility of Purchaser.

Exclusions

The warranty does not extend to, and Masimo is not responsible for, repair, replacement, or maintenance needed because of: a) modification of the Product or Software without Masimo's written authorization; b) supplies, instruments or electrical work external to the Product or not manufactured by Masimo; c) disassembly or reassembly of the Product by anyone other than an authorized Masimo agent; d) use of the Product with Sensors or other accessories other than those manufactured and distributed by Masimo; e) use of the Product and Software in ways or in environments for which they are not labeled; and f) neglect, misuse, improper operation, accident, fire, water, vandalism, weather, war, or any act of God. This warranty does not extend to any Product that has been reprocessed, reconditioned or recycled.

This warranty also does not apply to any Products provided to Purchaser for testing or demonstration purposes, any temporary Products Modules or any Products for which Seller does not otherwise receive a usage or purchase fee; all such Products are provided AS-IS without warranty.

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