# Real-time Dosimetry

RaySafe™

CONTENT

RaySafe i3 System Configurations

The RaySafe i3 is an active dosimetry system that provides real-time insights about radiation exposure, helping medical staff and physicians evaluate and take action to more effectively use all the radiation reduction solutions provided in the room. Especially suitable for interventional staff who have higher radiation exposure than most medical professions, because of scattered radiation.
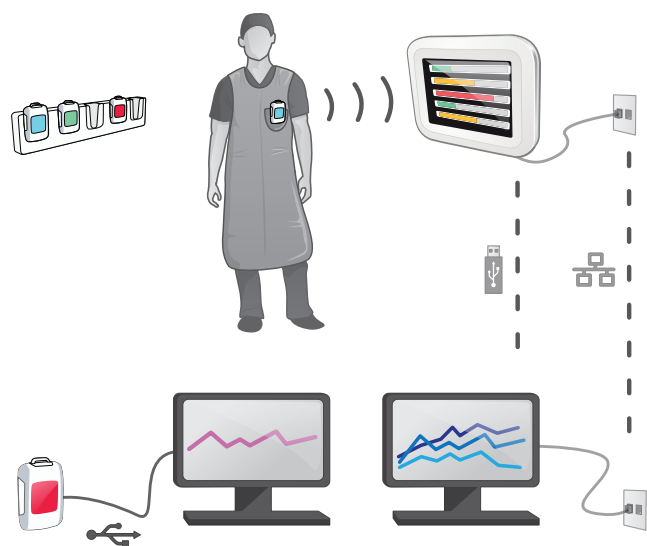
Use the RaySafe i3 to easily observe, minimize, and manage radiation exposure without being distracted from the task at hand.

The RaySafe i3 system comes in two main configurations:

- RaySafe i3 with On-screen Display
- RaySafe i3 with Stand-alone Display
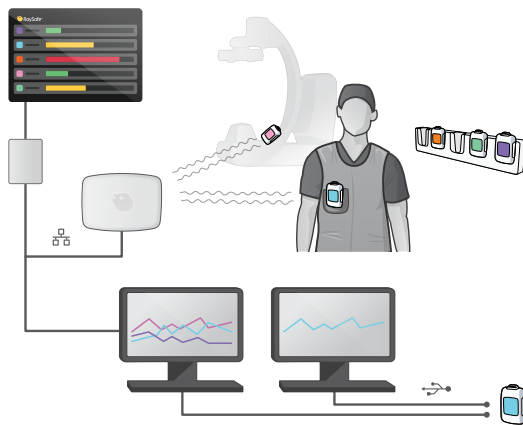
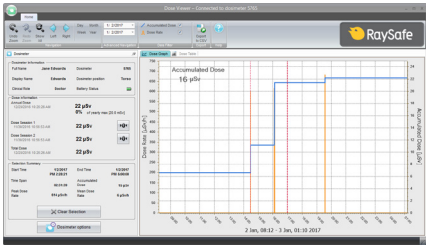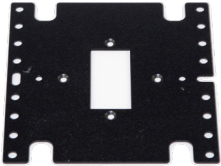RaySafe i3 with On-screen Display: Real-time dose rate indication, shown on the X-ray System´s main monitor.

RaySafe i3 with Stand-alone Display: Real-time dose rate indication, shown on dedicated display unit.

RaySafe i3 On-Screen Display System

RaySafe i3 On-Screen Display is targeted for different markets/radio frequences. A system includes:

RaySafe Real-time Hub Communicates with dosimeters within range. Collects data and makes it available for the RaySafe Video Unit, as well as the RaySafe Dose Manager Software. Can be accessed within the hospital network, via a web browser, to download stored dose data.	
RaySafe Video Unit Uses data from the RaySafe Real-time Hub to render the Real-time View, transmitted as a video signal (HDMI/DVI). The Real-time View is shown on the lab's main screen or on a separate display, and it shows dose rate for connected dosimeters in real time via green, yellow and red bars corresponding to each individual user.	
RaySafe Real-time Reference Dosimeter Provides X-ray start/stop time stamps in order to synchronize measurements from multiple dosimeters. A reference dosimeter is required for displaying the history bars on the right side of the Real-time View.	
RaySafe Reference Dosimeter Holder Can be affixed to an exposed surface, e.g. a C-arm.	

RaySafe Dose Viewer Software* Easy-to-use software for administration of individual RaySafe i3 dosimeters. Shows dose history for the connected dosimeter.	
RaySafe Video Unit Wall Holder VESA 75 holder for wall mounting of video unit.	
Cables & Power Supplies • 3 m and 30 m Ethernet cable • 2 m USB to micro-USB cable • HDMI-DVI cable • Power over Ethernet injector (for Real-time Hub) • Video Unit power supply and power plugs Power cable and extension cables according to region: • Europe power cable • US/Canada/Japan power cable • Australia power cable • UK power cable	

* RaySafe Dose Manager software can be purchased separately, see page 10.

Part No / Model	RaySafe i3 On-screen Display Packages
5293302	**RaySafe i3 On-screen Display Package, 866.0 MHz**
	India
5131252	**RaySafe i3 On-screen Display Package, 868.3 MHz**
	EU / EEA / CH: See list of countries on page 10.
5131265	**RaySafe i3 On-screen Display Package, 918.3 MHz**
	Canada & USA
5131276	**RaySafe i3 On-screen Display Package, 927.9 MHz**
	Japan

RaySafe i3 Stand-alone Display System

The RaySafe i3 with stand-alone display can be ordered in packages with or without the RaySafe Dose Manager software, and targeted for different markets/radio frequences. A system includes:

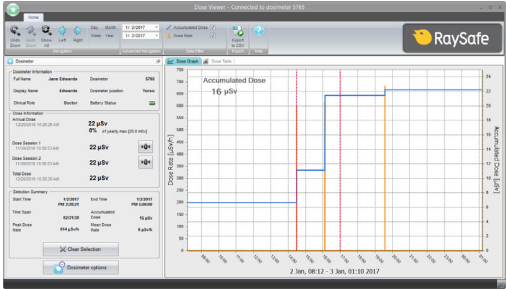|	
RaySafe Real-time Display Touch screen that shows dose rate in real time for up to 8 dosimeters, and stores dose and dose rate for all dosimeters within range.	
Four RaySafe Real-time Dosimeters Personal dosimeter for instant wireless transfer of dose data. Measures dose and dose rate for every second. Stores dose rate per second for last hour of exposure and dose per hour for 5 years.	
RaySafe Dosimeter Rack for Five Dosimeters For storage of 5 dosimeters when not in use. Can be affixed to a wall.	
RaySafe Dose Viewer Software Easy-to-use software for administration of individual RaySafe i3 dosimeters. Shows dose history for the connected dosimeter.	

RaySafe Dose Manager Software (may be included depending on system option) Advanced software for analyzing, reporting and archiving dose information. Collects dose history for all dosimeters. Possibility to retrieve dose information from multiple real-time displays through the hospital network or via a USB memory. Includes tools for data analysis. It is also possible to export data for furher analysis, e.g. in Excel.	
RaySafe Real-time Display Wall Holder VESA 75 holder for wall mounting of real-time display.	
Cables & Power Supply • Real-time Display power supply • 2 m USB to micro-USB cable Power cable according to region: • Europe power cable • US/Canada/Japan power cable • Australia power cable • UK power cable	
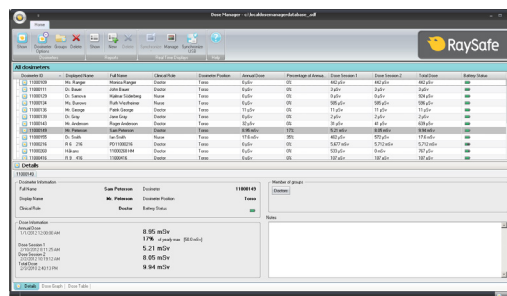
In addition, one mounting bracket of choice (MCS, Mavig or GCX) is included in a RaySafe Stand-alone System delivery. See page 10.
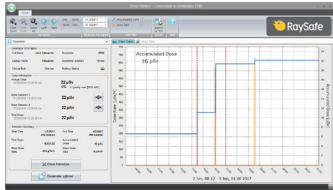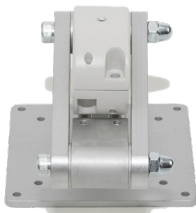
Part No / Model	RaySafe i3 Stand-alone Display Packages with RaySafe Dose Manager
5293287	**RaySafe i3 Package, including RaySafe Dose Manager Software, 866.0 MHz**
	India
5081023	**RaySafe i3 Package, including RaySafe Dose Manager Software, 868.3 MHz**
	EU / EEA: See list of countries on page 10.
5111956	**RaySafe i3 Package, including RaySafe Dose Manager Software, 868.3 MHz**
	China
5081038	**RaySafe i3 Package, including RaySafe Dose Manager Software, 918.3 MHz**
	Canada & USA
5129169	**RaySafe i3 Package, including RaySafe Dose Manager Software, 927.9 MHz**
	Japan

Part No / Model	RaySafe i3 Stand-alone Display Packages
5293279	**RaySafe i3 Package, 866.0 MHz**
	India
5081006	**RaySafe i3 Package, 868.3 MHz**
	EU / EEA: See list of countries on page 10.
5111921	**RaySafe i3 Package, 868.3 MHz**
	China
5081014	**RaySafe i3 Package, 918.3 MHz**
	Canada & USA
5129157	**RaySafe i3 Package, 927.9 MHz**
	Japan

RaySafe i3 Accessories

Part No / Model	RaySafe i3 Accessories	
5293222	**RaySafe i3 Real-time Dosimeter, 866.0 MHz**	
	See page 6 for a description.	
	India	
4923909	**RaySafe i3 Real-time Dosimeter, 868.3 MHz**	
	See page 6 for a description.	
	EU / EEA / CH: See list of countries on page 10.	
4923911	**RaySafe i3 Real-time Dosimeter, 918.3 MHz**	
	See page 6 for a description.	
	Canada & USA	
5132180	**RaySafe i3 Real-time Dosimeter, 927.9 MHz**	
	See page 6 for a description.	
	Japan	
5304537	**RaySafe i3 Real-time Dosimeter Bundle, 866.0 MHz**	
	Set of four dosimeters. See page 6 for a description.	
	India	
5274858	**4xRaySafe i3 Real-time Dosimeter Bundle, 868.3 MHz**	
	Set of four dosimeters. See page 6 for a description.	
	EU / EEA / CH: See list of countries on page 10.	
5274873	**RaySafe i3 Real-time Dosimeter Bundle, 918.3 MHz**	
	Set of four dosimeters. See page 6 for a description.	
	Canada & USA	
5274886	**RaySafe i3 Real-time Dosimeter Bundle, 927.9 MHz**	
	Set of four dosimeters. See page 6 for a description.	
	Japan	
4923927	**RaySafe Dosimeter Rack**	
	For storage of 5 dosimeters when not in use. Can be affixed to a wall.	

Part No / Model	RaySafe i3 Accessories	
4926891	**RaySafe Dose Viewer Software**	
	Easy-to-use software for administration of individual RaySafe i3 dosimeters. Shows dose history for the connected dosimeter. *Note: The latest version is required for i3 Real-time Dosimeters.*	
4926905	**RaySafe Dose Manager Software**	
	Advanced software for analyzing, reporting and archiving dose information. Collects dose history for all dosimeters. Possibility to retrieve dose information from multiple real-time displays through the hospital network or via a USB memory. Includes tools for data analysis. It is also possible to export data for furher analysis, e.g. in Excel.	
4712128	**MCS Mounting Bracket**	
	One mounting bracket of choice (MCS, Mavig or GCX) is included in a RaySafe Stand-alone System delivery.	
4712414	**Mavig Mounting Bracket**	
	One mounting bracket of choice (MCS, Mavig or GCX) is included in a RaySafe Stand-alone System delivery.	
4712438	**GCX Mounting Bracket**	
	One mounting bracket of choice (MCS, Mavig or GCX) is included in a RaySafe Stand-alone System delivery.	

* EU / EEA: Austria, Belgium, Bulgaria, Cyprus, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.
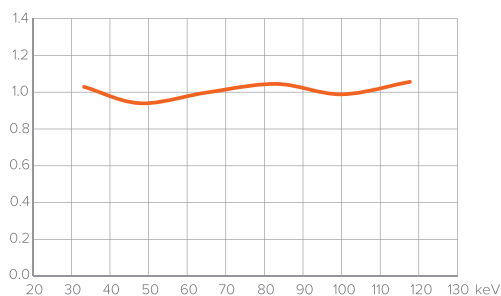
Specifications

Dosimeter	
Dimensions	40 x 58 x 17 mm (1.6 x 2.3 x 0.7 in.)
Weight	34 g (1.20 oz)
Operational quantity	$H_p(10)$
Energy dependence	< 25 % (N-series, 40 – 150 kV)
Temperature dependence	< 5 % (18 – 26 °C) < 25 % (15 – 18 °C, 26 – 35 °C)
Response time	< 1 s, above 100 μSv/h < 5 s, below 100 μSv/h
Integration interval	1 s
Detection limit	< 30μSv/h
Dose rate uncertainty (continuous radiation)	10 % or 10μSv/h (40 μSv/h – 150 mSv/h) 20 % (150 mSv/h – 300 mSv/h) 40 % (300 mSv/h – 500 mSv/h) The measured dose rate is monotonically increasing up to 1 Sv/h
Dose reproducibility	10 % or 1 μSv
Maximum lifetime dose	10 Sv
Battery	CR2450 (replaceable, 1 – 2 years lifetime depending on usage)
Communication	

Typical angular response (relative to 0°)
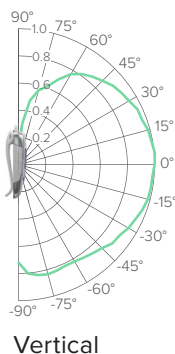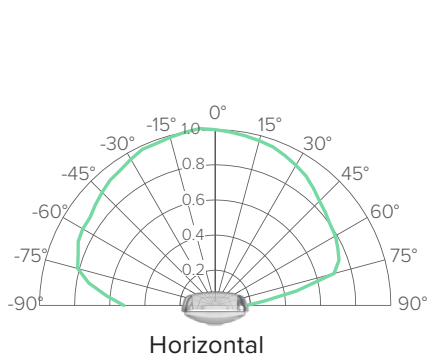
Typical energy response

Horizontal

Vertical

Video Unit	
Dimensions	108 × 83 × 24 mm (4.3 × 3.3 × 0.9 in)
Weight	280 g (9.9 oz)
Dose unit	Sv or rem
Power	External supply
Video output	DVI digital output: 2x HDMI 1.4a up to 1920×1200 at 60 Hz
Network	10Base-T Ethernet (RJ45 connector)
Real-time Hub	
Dimensions	184 × 134 × 35 mm (11.8 × 9.8 × 2.4 in)
Weight	180 g (6.3 oz)
Power	Power over Ethernet
Network	10Base-T Ethernet (RJ45 connector)
Communication	See "Radio" section below.
Real-time Display	
Dimensions	300 × 250 × 60 mm (11.8 × 9.8 × 2.4 in)
Weight	1240 g (43.74 oz)
Dose unit	Sv or rem
Display	10.4'' touch screen
Interfaces	Ethernet connection for Dose Manager. USB connection for synchronizing data to USB memory stick
Power	12 V DC, <1.5 A external power supply included
Communication	See "Radio" section below.
Radio	
Frequency	866.0 MHz, 868.3 MHz, 918.3 MHz or 927.9 MHz, depending on purchased configuration (see label on product)
Transmitter power	Dosimeter output: 3.2 mW Real-time Hub output: 1 mW Real-time Display output: 1 mW
Communication range	Typically 5 – 15 m, depending on the local environment
Software Requirements	
Operating system	Vista, 7, 8 or 10
System memory	At least 2 GB
Storage	At least 15 GB available space (Dose Manager)