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MRI System MRPFE/MRPE/MRFE Guide

For Specifiers, Purchasers, and Users of
Certolux MRI Lighting Systems

Certolux MRI System

Your Complete Overview Guide

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The System Overview

This system overview is for those specifying, purchasing, using or installing the MRI lighting system. The installation portion is intended for a qualified electrician who is familiar with MRI systems and their requirements. The system includes MRI Safe Power Enclosures, Filter Enclosures and compatible MRI LED luminaires. The system is simple to wire and is power limited to meet the requirements of a Class 2 low voltage system. The Power Enclosure and luminaires are listed by ETL to the ANSI/UL2108, ANSI/UL1598 and other applicable safety standards. The system is designed for use with MRI safe conduit systems and wiring methods.

Special attention is to be taken in selecting non-magnetic wiring connectors and conduit fittings. Do not use other manufacturers' fixtures, drivers or filters with this system.

Installer/Owner/User Responsibility:

The installation, maintenance, and operation of this system must be carried out by the electrician, purchaser, owner, and end-user in compliance with all relevant laws, regulations, and local electrical safety codes. This product must be installed exclusively by a qualified electrician.

IMPORTANT: Carefully read the entire set of instructions and warnings before starting the installation. These instructions are designed to aid in the installation and servicing of the fixtures and their power system. Ignoring these instructions may lead to serious consequences, including but not limited to incorrect diagnostics, fixture malfunction, damage, injury, or even death. For replacement parts, please contact Certolux.

Risk of fire or electric shock. Make sure that all power is turned off at the breaker and locked out throughout the installation process. It is essential that all wiring polarity is strictly followed for all connections. Miswiring may damage LEDs, filters or drivers. It is required that before energizing the system all connections are checked for proper polarity. As with all LED luminaires, do not connect luminaires to energized drivers because permanent damage to the fixture will result.

System Overview: The system consists of three basic components: The power enclosure, the filter enclosure and the various fixtures. These are separated physically but electrically are grouped in zones. Zones are groups of matching fixtures that share a driver, filter and dimming circuit.

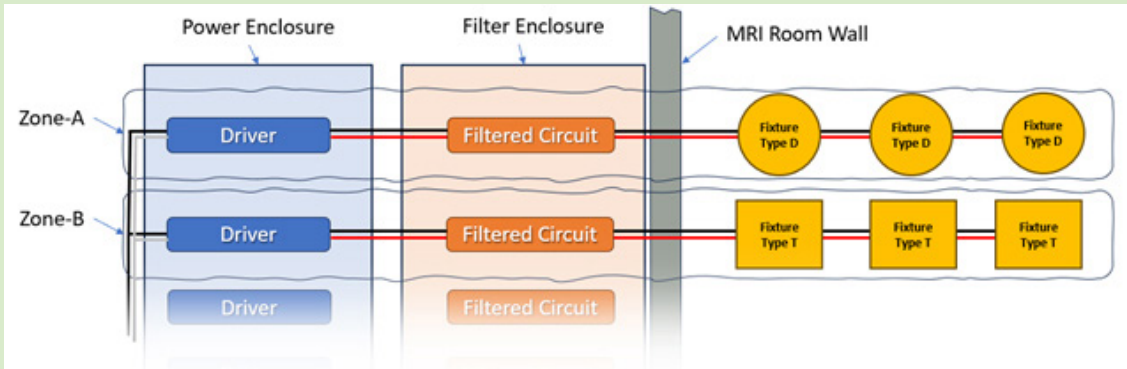


Figure 1. Component Electrical Layout



Figure 2. System Components

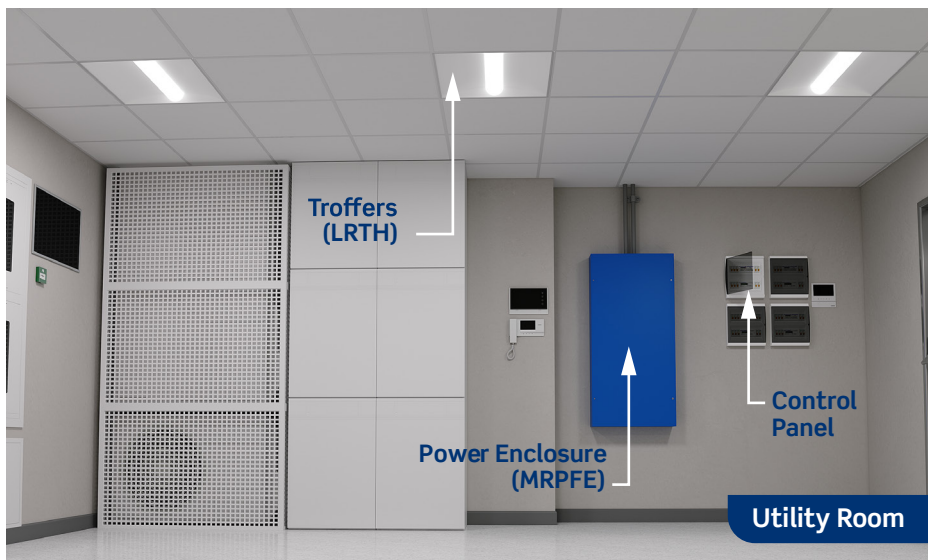


Figure 3. Utility Room

Power Enclosures (MRPEx): Power enclosures are defined by the number of zones (fixture circuits) they can support. Each power enclosure has separate LED drivers that can power multiple fixtures of the same type. When a driver is combined with its filter and fixtures, it forms a “Zone,” which allows all connected fixtures to share dimming and filtering and operate together. For example, an MRPE8 has eight zones or circuits. Each zone can power one or more fixtures, depending on the required brightness (lumens). Each circuit can be controlled individually or grouped with others to dim together. MRPEx units are installed in the utility room where they are easily accessible for installers and service technicians. The specification sheet includes a chart indicating that shows the maximum number of fixtures each zone can support. Power enclosures are to be installed outside the not installed inside the shielded room.

Typically, MRPEx are mounted below the MRFEx and aligned for straight conduit runs between the two components. This is not a requirement. The standard total wiring **distance between MRPEx and fixtures is 50 ft or (30m)**. **Consult the factory if you need longer distances.**

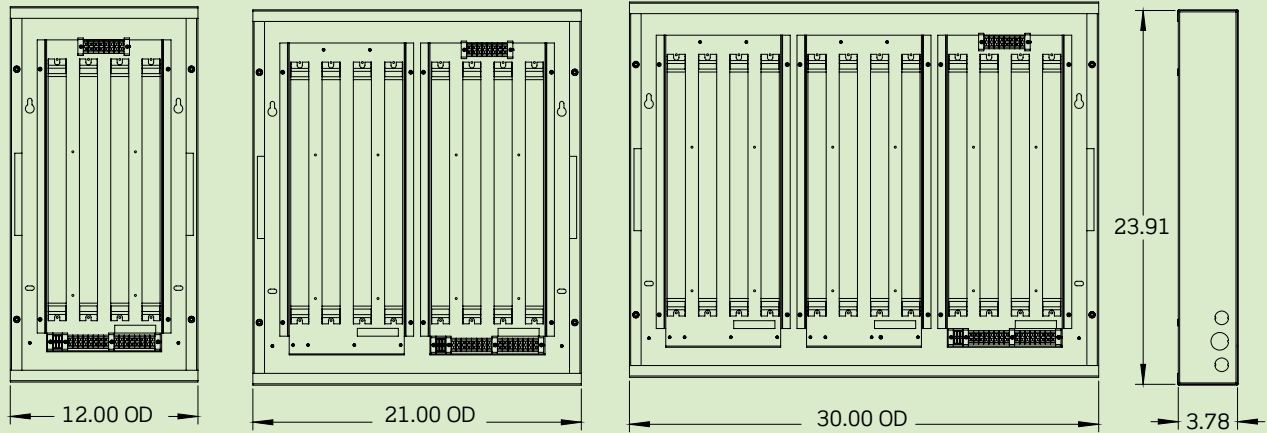


Figure 4. Power Enclosures MRPE4, MRPE8, and MRPE12

Filter Enclosures (MRFEx): Filter enclosures use multi-circuit low voltage entrance filters. Filter enclosures are described by the number of circuits they can filter. There are three sizes of filter enclosures, four (MRFE4), eight (MRFE8) or twelve (MRFE12) circuits. Therefore, a MRFE8 filters up to eight circuits or as many as 24 fixtures, depending on the lumen rating of the fixtures. MRFEs are mounted high on the wall of the utility room so that the filter wiring can enter the shielded room inside the plenum space, above the architectural ceiling. (See figures 2 & 3) Penetration of the shielding should be performed in a manner consistent with maintaining shield integrity. All holes are to be kept to a minimum and sealed according to RF recommended practices. The filter stem metal mesh bushings provided are to be placed against the shield and the filter washer, on the inside of the MRI room.

The junction box within the shield should be positioned over the threaded filter stem and secured with the nut provided. When complete, there should be no gaps between the filter stem and the shield. (See figure 6) (Entrance filters are required for all wiring entering the MRI room. AC power and dimming control wiring do not need to enter the room for this system and are not intended to be connected to the MRFEx.

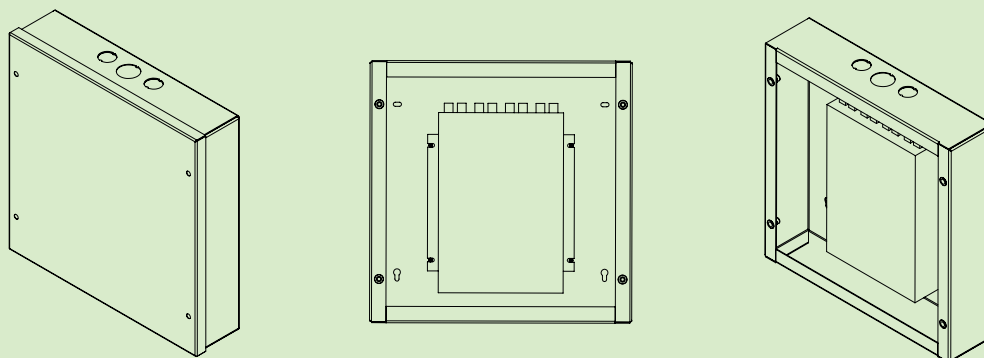


Figure 5. Filter Enclosures MRFE4, MRFE8, and MRFE12

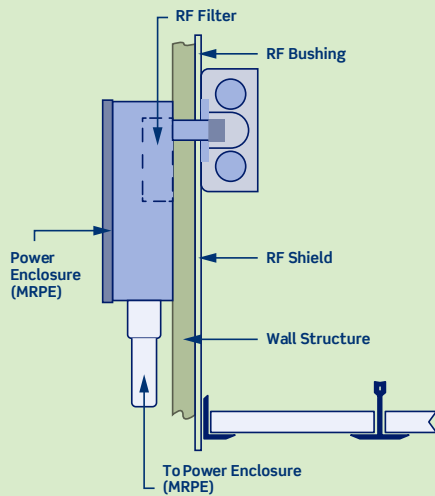


Figure 6. Filter Enclosure Section View



Figure 7. MRPFE4 Combined Power and Filter Enclosure

Combined Power and Filter Enclosure (MRPFE):

Combined power and filter enclosures are defined by the number of circuits they provide. They are installed in a similar location and manner to MRFE. The MRPFE’s one-piece enclosure is easy to install and ideal when space, fixture count, and illumination needs are met.

Fixtures:

MRI fixtures are specially designed to operate within proximity to sensitive diagnostic imaging equipment that produces strong magnetic fields. The MRPE and MRFE work together with the special fixture to create light without negative consequences; by affecting the diagnostic image, the imaging equipment or interacting with strong magnetic fields. Care is taken in selecting fixture materials and electronics compatible with this application.

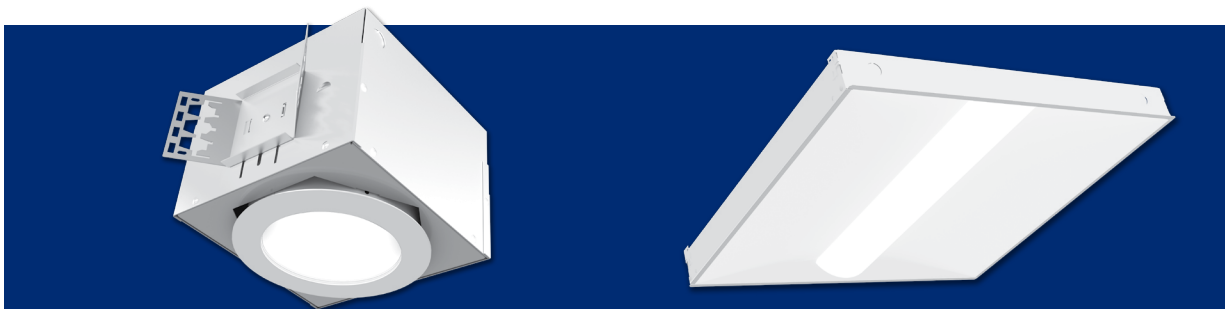


Figure 8. MRI Downlight and Troffer

Before you begin:

(Safety Boiler Plate)

- Only experienced and licenced electricians are to install this equipment.
- Turn off and lock out and tag all circuits involved at the distribution panel.
- Wear personal protective equipment.
- Safety glasses and gloves are to be worn at all times.

Grounding:

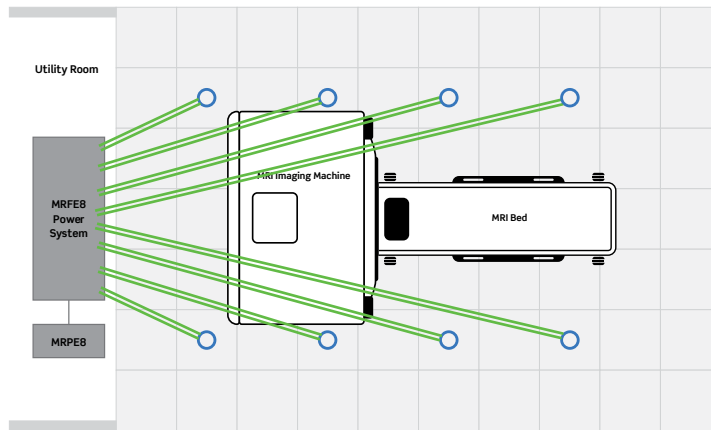
All fixtures and the conduit system are to be grounded with a single path back to the filter junction box and RF shield. Avoid creating ground loops of conduit or wire that take separate paths.

Installation of Power and Filter Enclosures (MRPE4, MRPE8 or MRPE12)

1. Plan the MRPE install: Determine the path for the new circuit and the location of the MRPE enclosure. The wiring length (one-way distance) should be less than 50 feet. Choose a location that is convenient to pull wire and run conduit to the Filter Enclosure (MRFE). (There will be multiple circuits involved so marking and color-coding wires will be helpful. For simplicity, consider installing or locating the MRFE prior to installation of the MRPE.)
2. Protected Branch circuit power enters the enclosure through the knockouts located on the bottom or lower sides of the enclosure. Class 2 fixture power exits at the top of the power enclosure.
3. Turn Off Power: Ensure the power at the electrical panel is turned off and locked out.
4. Mount the Power Enclosure(s): Mark the mounting hole locations as determined by the drawing provided with the spec sheet. Drill the holes for the chosen anchor method. (Do not penetrate the MRI shielding.) Secure the Power Enclosure to the wall using wall anchors or suitable hardware by others. Ensure it is level and firmly attached.
5. Mount the Filter Enclosure(s): Mark the mounting and stem hole locations as determined by the drawing provided with the spec sheet. Drill the holes for the chosen anchor method (Do not penetrate the MRI shielding.)
6. Drill the stem hole penetration of the shield. All holes are to be kept to a minimum and sealed according to RF recommended practices.
7. Secure the Filter Enclosure to the wall using wall anchors or suitable hardware by others. Ensure it is level and firmly attached.
8. Install a junction box (by others). Before attaching the junction box, install the metal mesh bushings provided over the filter stem are to be placed against the shield and the filter washer, on the inside of the MRI room. The junction box within the shield should be positioned over the threaded filter stem and secured with the nut provided. When complete, there should be no gaps between the filter stem and the shield. (See figure #6)
9. Secure the junction box to the shield.
10. Remove the MRPE and MRFE enclosure covers and the two internal wireway covers of the power enclosure.
11. Run the branch circuit conduit.
12. Connect the supply wires:
 - a. Ground Wire: Connect the ground wire to the ground bus in the Power Enclosure.
 - b. Neutral Wire: Connect the neutral wire to the neutral bus in the Power Enclosure.
 - c. Hot Wire: Connect the line wire to the supply bus in the Power Enclosure.
13. Wire dimming control wiring, routing it outside of the MRI shielded area.
14. Replace the lower wireway cover.
15. Select a low voltage wiring method, see Figure 9.

There are two approved methods:

A. Individual zones for each fixture. (8 Zones shown)



B. Each Zone supplies multiple fixtures (2 zones shown)

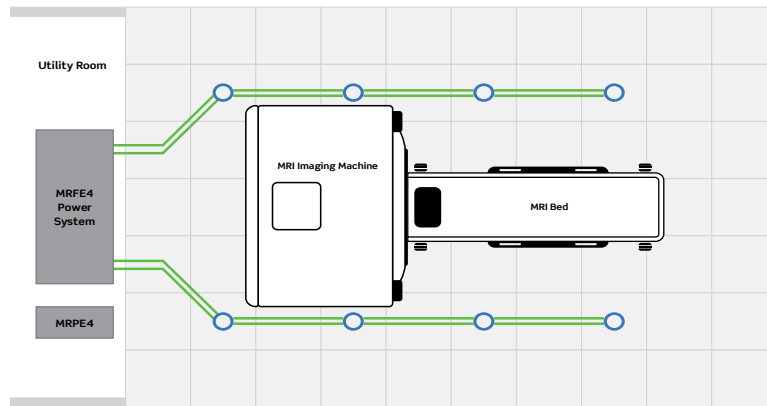


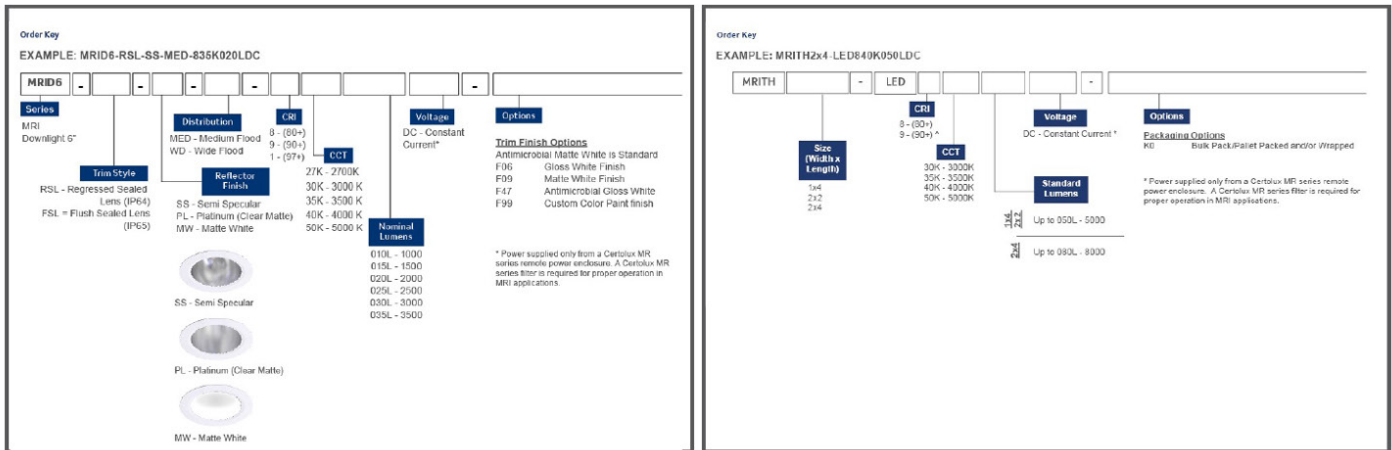
Figure 9. Low Voltage Wiring Options

For both low voltage wiring options please follow these instructions:

- a. All low voltage fixture conductors are to be 18-gauge copper conductors or larger. Splices are to be made in the provided junction boxes using non-magnetic connectors. Caution: Standard wire nuts are not acceptable. Choose connectors that show no attraction to a typical magnet.
 - b. Fixtures, filters and drivers are strictly wired in parallel, red to red, black or blue to black or blue. The maximum number of fixtures permitted to be attached to a single circuit are marked at the connection points within the power enclosure and are also found in a chart on the product spec sheets.
16. Install ordinary conduit and wiring from the power to the filter enclosure of a size capable of supporting your wire type and quantity.
 17. Starting at zone 1, Make connections at the screw terminals for the positive and negative DC connections and mark both ends. Continue until all zones are wired and marked. Check the polarity of each circuit.
 18. Secure internal and external enclosure covers.
 19. Install fixtures according to their own instructions
 20. Install an MRI compatible conduit system from the filter(s) to the fixture(s) and low voltage wiring according to the chosen method and electrical plans.
 21. Make connections to the filter and fixture using wiring connectors that are MRI compatible. Be sure and check for proper polarity of fixtures. (Reverse polarity will damage fixtures and filters)
 22. Secure junction box cover(s).
 23. Finish Up: Replace the panel cover and secure it with screws.
 24. Test the Circuit: Turn the main power back on and test the new circuit to ensure it is working correctly.

How To Order:

MRI ready fixtures are marked with a series name beginning with “MR”



Step #2: Select your MRPE Power Enclosure

Certolux MRI luminaires must be paired together with Certolux issued power systems (MRPE). To select the correct power enclosure, begin by arranging the fixtures by circuit within scan room. Note that all fixtures within one circuit must be of the same type and lumen code. Each circuit will be powered by a single driver contained in the power enclosure. Next, consult the chart below for fixture quantity limits per circuit. Next, select the appropriate Power Enclosure based on the total number of circuits configured. Last, complete the Power Enclosure catalogic by entering the quantity of fixtures, fixture type, and the lumen code for each circuit in sequence. See example below.

Note that multiple circuits can be grouped for zoned switching and dimming purposes

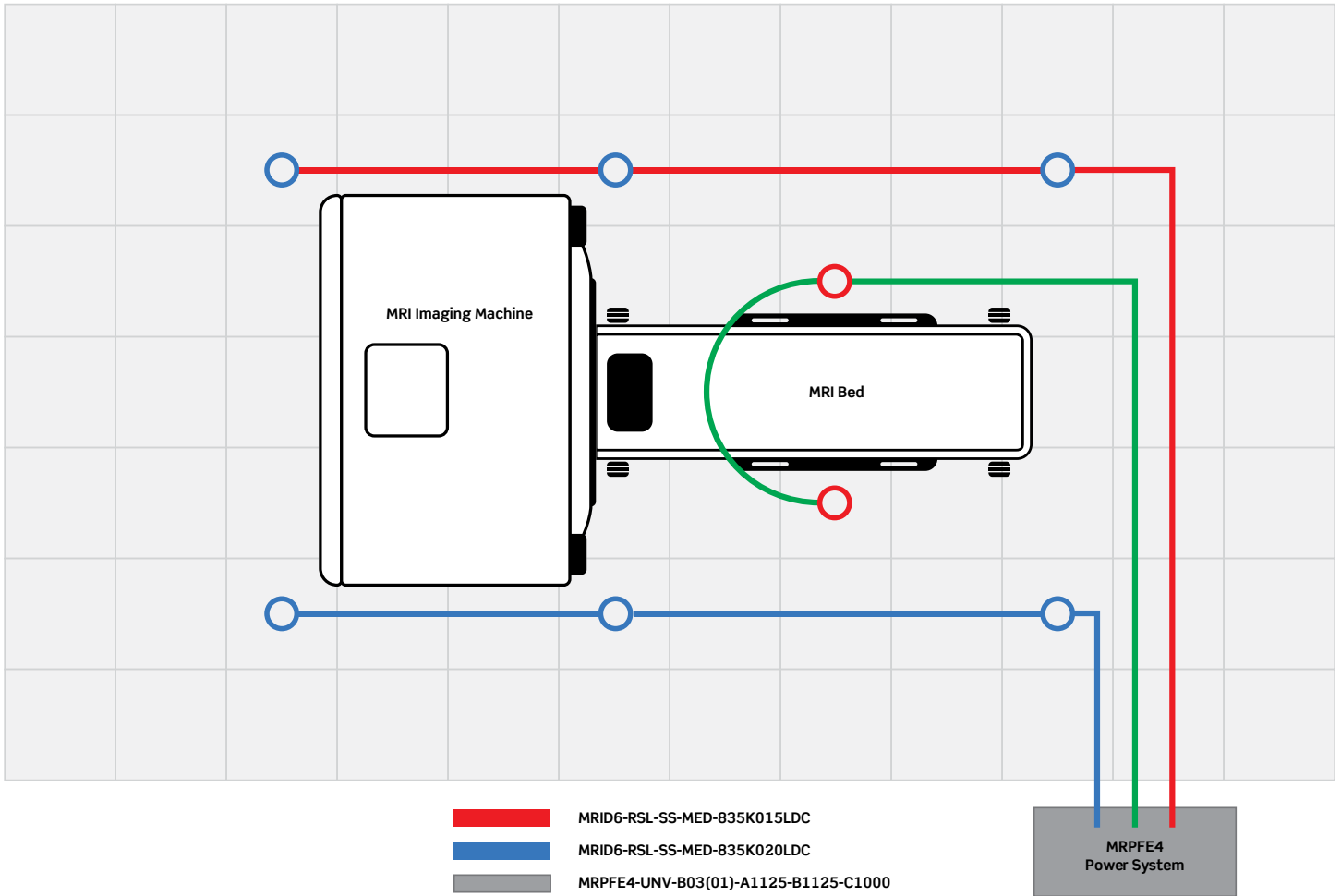
LED Performance Data				
Size	Nominal Lumens	Delivered Lumens	Watts	Lumens Per Watt
1x4	2000	2037	13	152
	4000	3968	28	143
	4700	4701	34	139
	5000	5027	37	138
2x2	2000	2047	13	156
	3200	3178	21	151
	3700	3710	25	148
	4000	4058	28	146
	4500	4504	31	144
	5000	5076	36	142
2x4	4000	4135	28	149
	5000	5036	35	145
	7200	7214	50	144
	8000	8008	57	141

Step #3: Select your Filter Enclosure per Room

Every circuit must be individually filtered. Certolux's MRI lighting system utilizes a MRI43100W 4-circuit filter. Select a filter enclosure that meets or exceeds your total number of circuits per scan room.

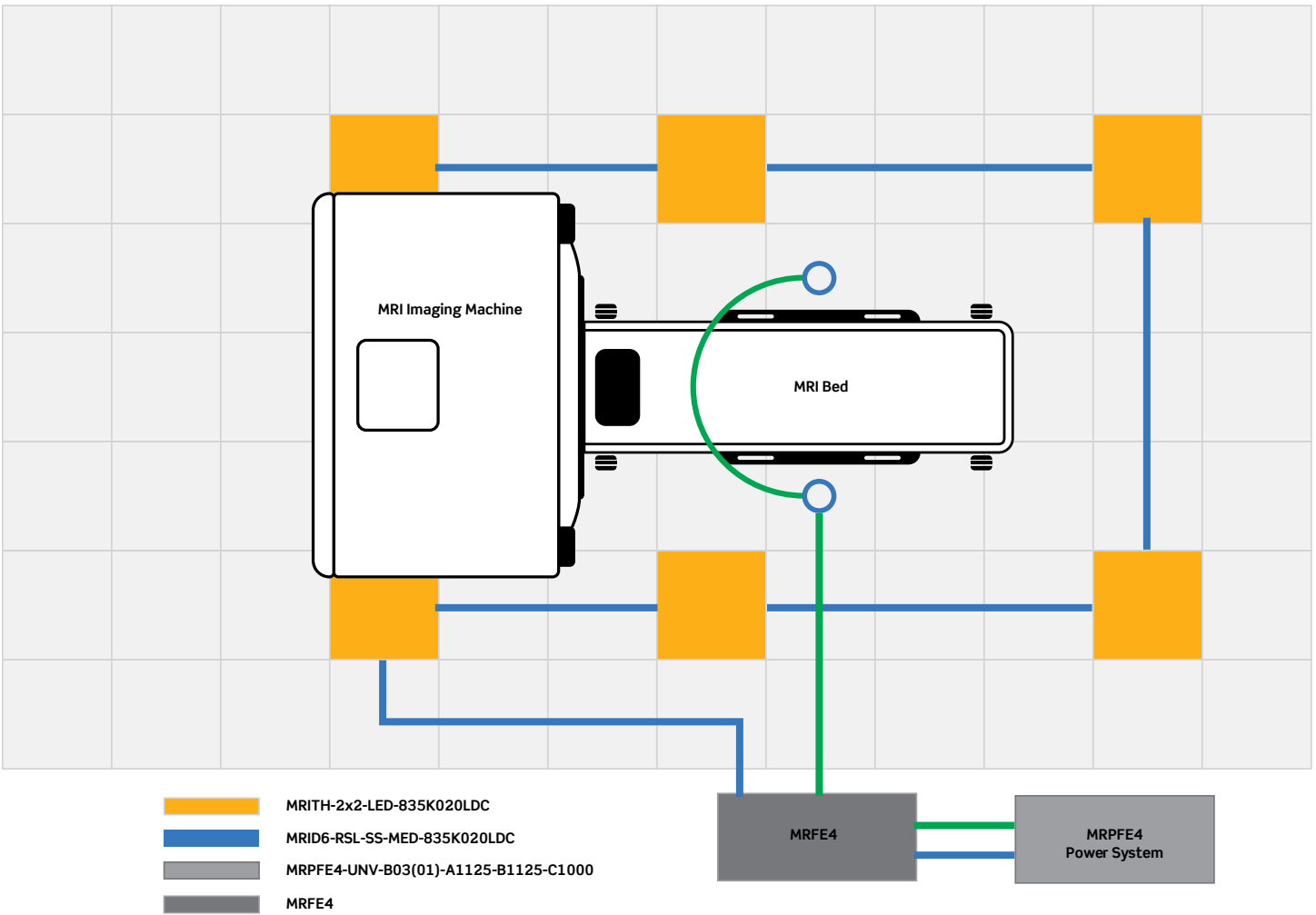
Model	Max # of Circuits
MRFE-4	4
MRFE-8	8
MRFE-12	12

Ordering Key Example Room 1:



Power Enclosure	# of Circuits	Voltage	Controls	Circuit A		Circuit B		Circuit C					
				Circuit Label	Drive Current (mA)	Circuit Label	Drive Current (mA)	Circuit Label	Drive Current (mA)				
MRPFE	4	--	UNV	B03(01)	-	A	1125	-	B	1125	-	C	1000

Ordering Key Example Room 2:



Power Enclosure	# of Circuits	Voltage	Controls	Circuit A		Circuit B	
				Circuit Label	Drive Current (mA)	Circuit Label	Drive Current (mA)
MRPE	4	-- UNV	B03(01)	A	1650	B	1000



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