SmartLED™
MRI LIGHTING SYSTEM

Installation Guide/Owner's Manual
MRI DMX System

Technical Support: 313-259-6400, Press 5

KIRLIN
HEALTHCARE LIGHTING

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1.0 SCOPE

The KIRLIN MRI DMX System is intended for installation and use in MRI suites or where ferrous material and/or EMI/RFI interference is a concern. The system includes a MRI DMX Remote Driver System and Luminaire (sold separately) that work in harmony to provide a quality lighting experience.

This manual provides general installation, use, and application guidelines. Specifications are subject to change without prior notice.

This lighting system is Class 2 low voltage and can be installed in plenum or non-plenum locations in accordance with required local, state, provincial, country and NEC/CEC regulations. Only output cables marked with "CMP" may be installed in plenum locations.

2.0 OWNER/USER RESPONSIBILITY

It is the responsibility of the contractor, installer, buyer, owner and user to install, maintain, and operate the KIRLIN MRI DMX System in accordance with all applicable laws, regulations and local electrical safety authority requirements.

This product is only to be installed by a qualified electrician.

IMPORTANT!
Thoroughly read the entire instructions guide and warnings before beginning installation. The instructions provided are intended to assist in the installation and service of the corresponding product. Failure to follow the instructions may result in product malfunction, damage, injury or death. Contact your Kirlin service representative for replacement parts and procedures.

3.0 SAFETY & IMPORTANT INFORMATION

Risk of fire or electric shock. Ensure all power is turned off during installation process. Refer to wiring diagrams to prevent damages and malfunctions.

The MRI DMX Remote Driver System may only be connected and installed by a qualified electrician. This system requires knowledge of luminaires and electrical systems. If not qualified, do not attempt installation or maintenance. All applicable regulations, legislation, and building codes must be observed. Incorrect installation of the LED driver can cause irreparable damage to the MRI Lighting System.

Pay attention when connecting the LEDs: polarity reversal results in no light output and often damages the LEDs and/or filters.

Connecting fixtures with power **ON** will "hot plug" the LEDs and cause damage.

Must use Kirlin supplied drivers, RF filters, and light fixtures to maintain warranty.

Requires #18 AWG minimum twisted pair shielded wire for all driver wiring.
All system wiring must have a UL electrical rating of 300V.

3.0 SAFETY & IMPORTANT INFORMATION (Continued)

The maximum total wire length from the enclosure to filter and filter to fixture(s) is 50 feet.

To prevent wiring damage or abrasion, do not expose wiring to edges metal or other sharp objects.

4.0 STANDARDS & COMPLIANCE

This Low Voltage Luminaire System complies with UL 2108 UL Listed, Class P, Class 2	UL 1310 UL 8750
Conducted emissions	FCC title 47 CFR part 15 class B
Radiated emissions	FCC title 47 CFR part 15 class B
Electrostatic discharge	EN 61000-4-2
DMX	ANSI E1.11 – 2008 (R2013), USITT DMX512-A, ANSI E1.20 – 2010
Surge protection	ANSI 62.41 1991 category B1: 2.5kV DM, 2.5kV CM @ 30 Ohm DMX input 0.5kv DM
Restriction of hazardous substances	RoHS3 (Directives 2011/65/EU-2015/863/EU)

5.0 ELECTRICAL REQUIREMENTS (Per LED Driver)

Nominal input voltage range AC	120 - 277V
Absolute input voltage range AC	108 - 305V
Input frequency range	50 - 60Hz
Maximum wattage	50W
Efficiency at full load	85%
Power factor at full load	> 0.95
THD at full load	< 20%
Maximum inrush current	< 100mA^{2}s @ 120V / 60Hz < 100mA^{2}s @ 277V / 60Hz
Surge protection	2kV differential mode (DM) 2kV common mode (CM)
Maximum standby power	0.5W

6.0 DIMMING CONTROL CHARACTERISTICS

Control protocol	DMX 512-A
Dimming range	100% - 0.4%, off
Dimming curve	Logarithmic*

**Can be programmed to different curves via RDM.*

7.0 BEFORE YOU BEGIN

Before You Begin

- Shut **OFF** power at fuse box or circuit breaker before installation, inspection or removal.
- Properly ground enclosure to main earth ground.
- To reduce the risk of fire or electric shock, **NEVER** interconnect or short output terminations.

Electrical Requirements

- This driver system is intended for connection to a 20A branch circuit and an appropriate disconnect device shall be provided as part of the building installation.
- All secondary output circuits are class 2 low voltage.

Mounting and Environmental Requirements

- This driver system is rated for dry locations only and is designed to be wall mounted.
- This driver system is rated for operation at a maximum ambient temperature of 25ºC.
- Allow sufficient spacing around enclosure for convection air flow.

Environmental Conditions

Enclosure is intended for use in ambient temperature of 25°C max.

Module operating ambient temperature (Ta) range	-20°C to +50°C
Drivers acoustic noise - steady state	< 24dBa (Class A)
All components	Dry location only

8.0 SYSTEM OVERVIEW: MRI-DMXPS

MRI-DMXPS Cabinet

Power Supply Enclosure and Drivers

- 24" x 18" x 4.5" carbon steel enclosure supports up to **8 Remote Drivers**
- Wall-mounted enclosure fabricated from 16 gauge steel. Includes flat, removable cover fastened with plated steel screws. Cover design permits easy removal without extracting cover screws. Mounting holes on back of cabinet. Removable knockouts on all four sides.
- Certifications and Compliance: NEMA 1 rating, UL Listed

SmartLED™ RGBW Filter Kit

For use with RGBW MRI Luminaires

- Allows power and RGBW DMX signal to be delivered into the MRI suite
- Removes RFI/EMI from electrical circuits entering the MRI suite
- Simple plug-and-play wiring inside MRI suite via non-ferromagnetic connected circuit board (included)

RFI-4100D Filter

PDB-04 Plug-in Distribution Box

Wall-Mounted Multi-Zone DMX Controller

Advanced programmable DMX lighting controller with a touchscreen interface

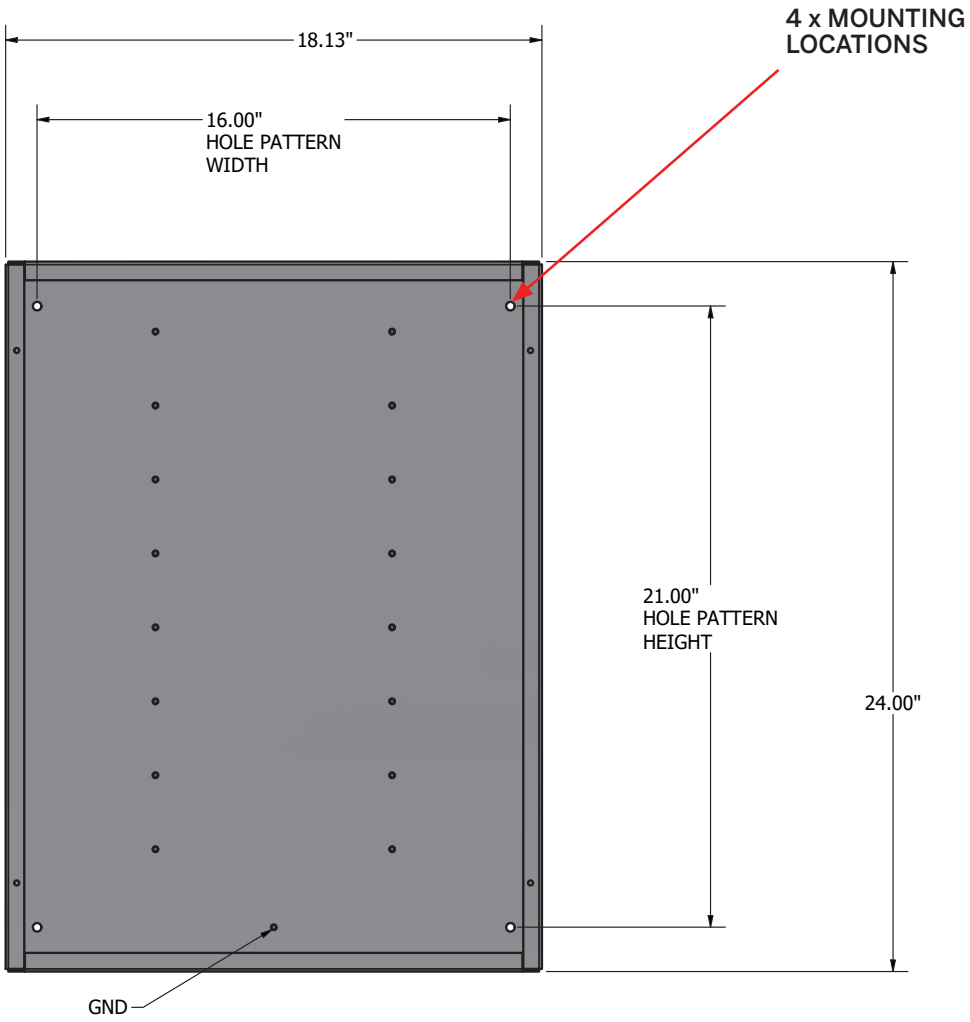
- Wall-mounted lighting controller
- Up to 12 preset scenes on 10 zones
- Scroll wheel and quick access dimmer, scene, RGB color and speed buttons
- Tempered sleek glass front panel
- USB connectivity for programming and control
- Multi-zone microSD memory

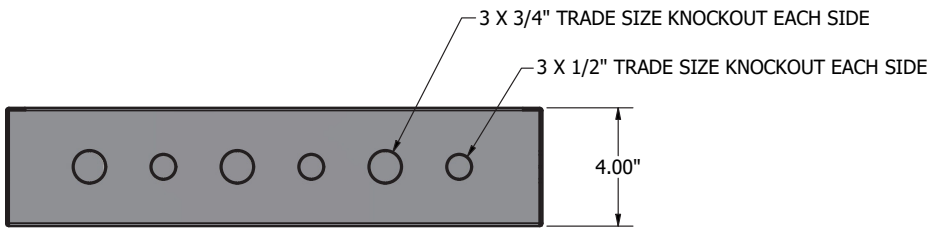
MRI-DMXWP

9.0 CABINET INSTALLATION

Mounting

1. Loosen the 4 screws that mount the cover panel; lift cover to align key hole slots, remove and set aside.
2. Place the enclosure in the desired location and mount using the 4 designated mounting locations.
3. After system installation is complete, replace the cover panel and tighten the 4 mounting screws.

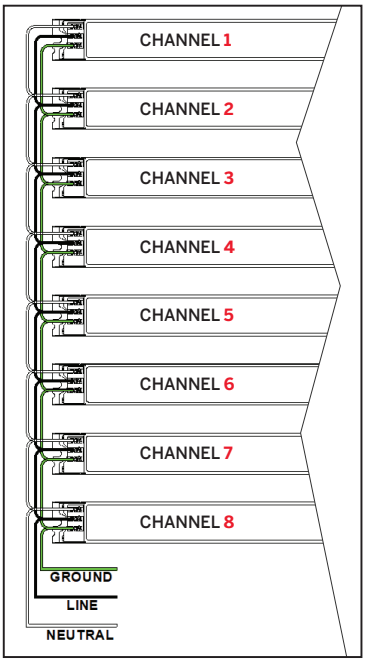




9.0 CABINET INSTALLATION (Continued)

Line Voltage Input Connections

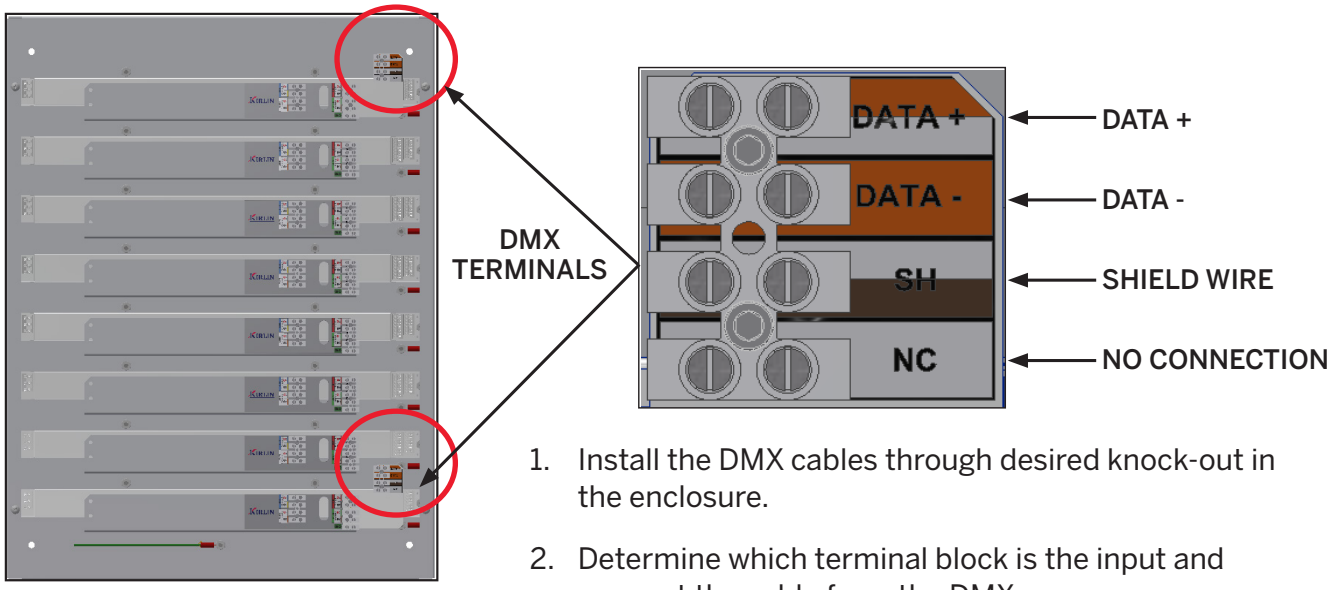
NOTE: Each enclosure ships with jumper wires installed to speed up installation. All system wiring must have a UL electrical rating of 300V minimum.



1. Install the AC feed through the desired knock-out in the enclosure.
2. Connect the AC Input Line, Neutral, and Ground wires to the supplied leads.

DMX Connections

NOTE: Either DMX terminal block can be used for Input or Output. Use of the 120 Ω resistor is required at the end of the DMX chain, supplied by others.



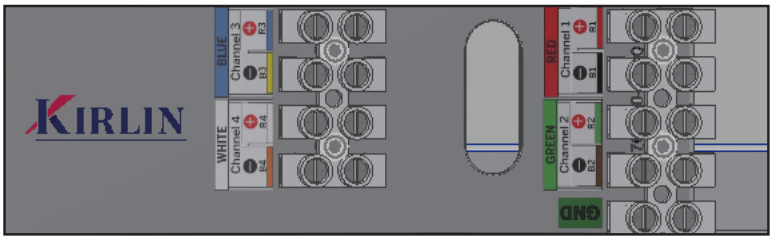
1. Install the DMX cables through desired knock-out in the enclosure.
2. Determine which terminal block is the input and connect the cable from the DMX source.
3. Connect 120 Ω terminating resistor or DMX output cable to next cabinet, if applicable.

9.0 CABINET INSTALLATION (Continued)

Output Connections

NOTE: Requires #18 AWG minimum twisted pair shielded wire. All system wiring must have a UL electrical rating of 300V minimum.

Suggested cables are: Digikey P/N: CE2208W-100-ND
MF GPA: E22085.41-02



1. Install the LED load wires through the desired knock-out in the enclosure.
2. Connect the twisted shielded pair wires to the terminal block as shown. Each driver has a load description value that indicates the fixture load it will support that can be used in conjunction with section 13.0 to determine wiring and driver connection. **Make note of this load description value on the distribution box that the wiring is connected to for reference when wiring fixtures. DO NOT** connect shield wire from driver cabinet to room shield ground bar or filter.

10.0 FILTER/PLUG-IN DISTRIBUTION BOX INSTALLATION

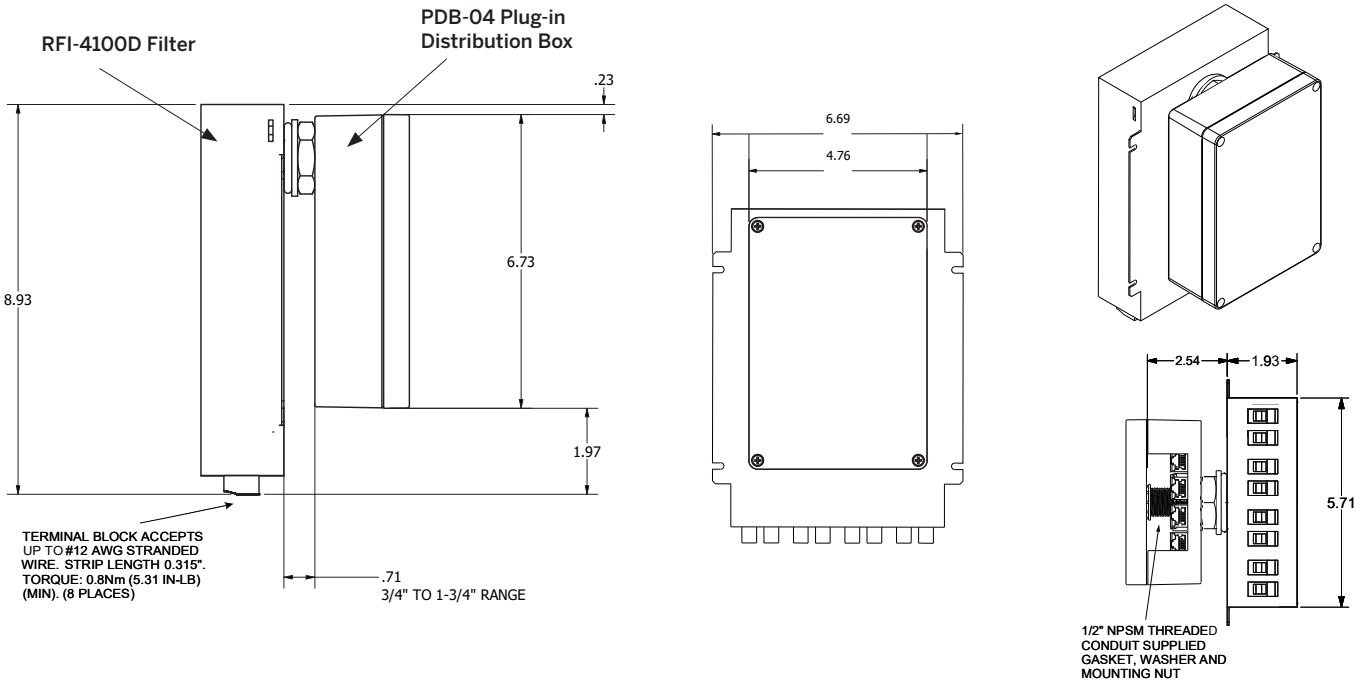
The filter is installed on the exterior of the room shield. The plug-in distribution box is installed on the interior of the room shield. All wiring between driver modules and fixtures must pass through filter and plug-in distribution box.

RFI-4100D Filter

PDB-04 Plug-in Distribution Box

10.0 FILTER/PLUG-IN DISTRIBUTION BOX INSTALLATION (Continued)

Dimensions: RFI-4100D (4-Channel Filter) & PDB-04 (Plug-in Distribution Box)

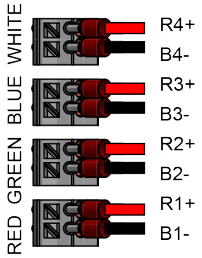


Input Requirements

- **WARNING: DO NOT** connect shield wire from driver cabinet to room shield ground bar or filter.
- This filter unit is intended for connection to a branch circuit provided from a Kirlin SmartLED™ MRI-DMXPS **ONLY. DO NOT** connect this filter to any other equipment or damage will occur.
- When connecting SmartLED™ filter, observe '+' and '-' polarity connections to prevent damage to filter.
- All connections in/out of filter are Class 2 low voltage.

Mounting Steps

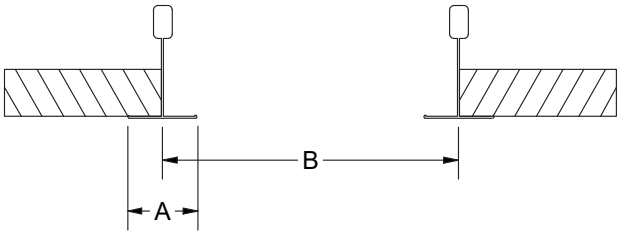
1. Mount filter on exterior of room shield with wiring nipple passing through wall shielding.
2. Pull filter wires through plug-in distribution box access hole and mount plug-in distribution box inside MRI room.
3. Install nut and washer on wiring nipple to secure plug-in distribution box.
4. Each wire on the filter is labeled. Connect wires to corresponding circuit board connection. **Note:** If plug-in distribution box cannot be mounted on filter nipple, use "SHIELD" terminal block to connect to room shield.



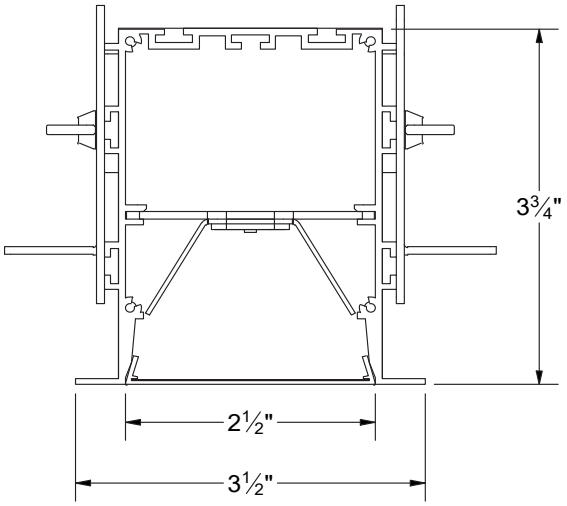
11.1 LINEAR FIXTURE INSTALLATION: GRID

Grid Configuration

Grid Spacing - Width



Grid Size (A)	Grid Width Center to Center (B)
9/16"	3 5/8"
15/16"	4"



Housing Size Reference

Grid Spacing - Length

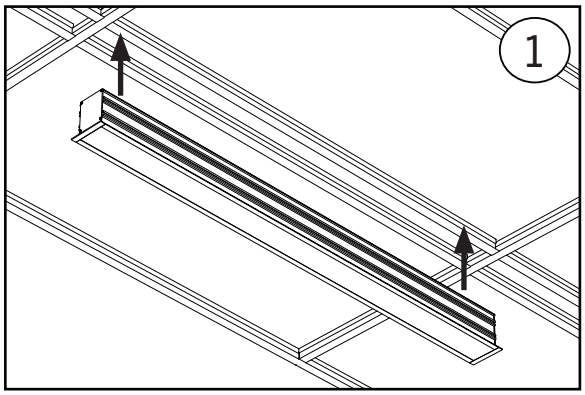
Fixture Length (Actual)	Grid Size (A)	Grid Length on Center
2 FT (23 7/8")	9/16"	24"
	15/16"	24"
4 FT (47 7/8")	9/16"	48"
	15/16"	48"
6 FT (71 7/8")	9/16"	72"
	15/16"	72"
8 FT (95 7/8")	9/16"	96"
	15/16"	96"
10 FT (119 7/8")	9/16"	120"
	15/16"	120"
12 FT (143 7/8")	9/16"	144"
	15/16"	144"

(For lengths longer than 12 FT contact factory)

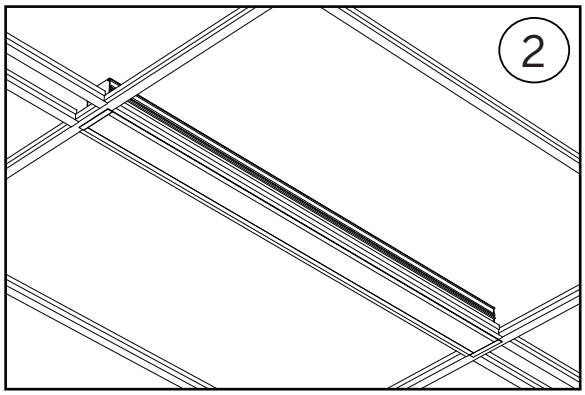
11.1 LINEAR FIXTURE INSTALLATION: GRID (Continued)

Grid Installation - From Below

- Installed occupancy side, flange fully visible from below
- For lengths over 4 ft, sections must be joined prior to being placed into ceiling (follow steps on pg. 13).



Prepare ceiling grid to the specified size. Then raise the fixture from below into the ceiling grid opening.

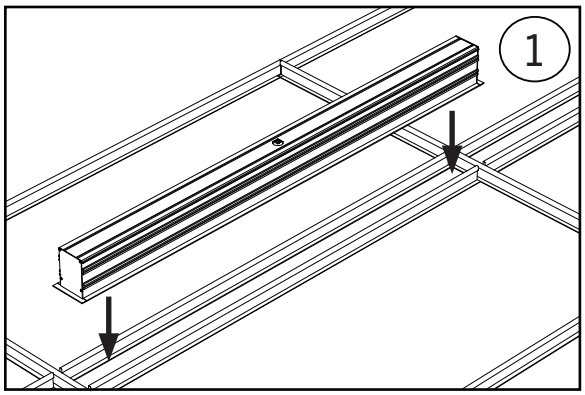


Support fixture from below ensuring trim sits flush against and square to the ceiling grid.

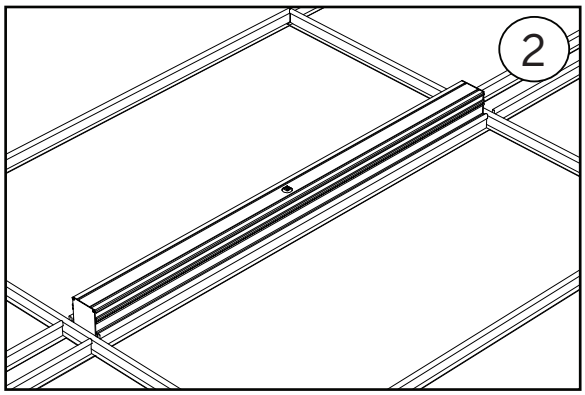
(Removing adjacent ceiling tiles is necessary to install fixture.)

Grid Installation - Drop-In

- Installed plenum side, flange mostly contained behind grid
- For lengths over 4 ft, sections must be joined prior to being placed into ceiling (follow steps on pg. 13).



Prepare ceiling grid to the specified size. Then lower the fixture from above into the ceiling grid opening.

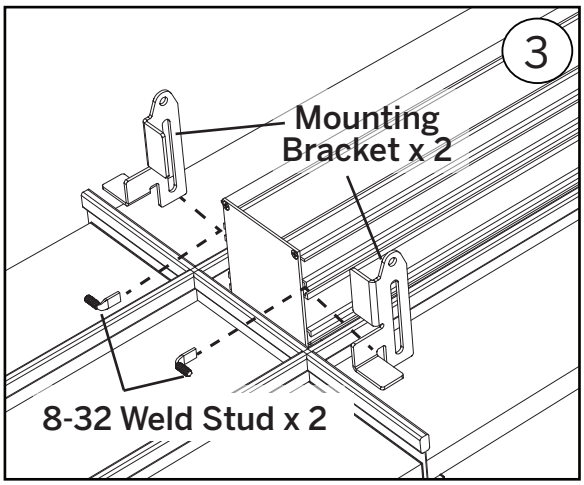


Ensure fixture trim sits flush on top of and square to ceiling grid.

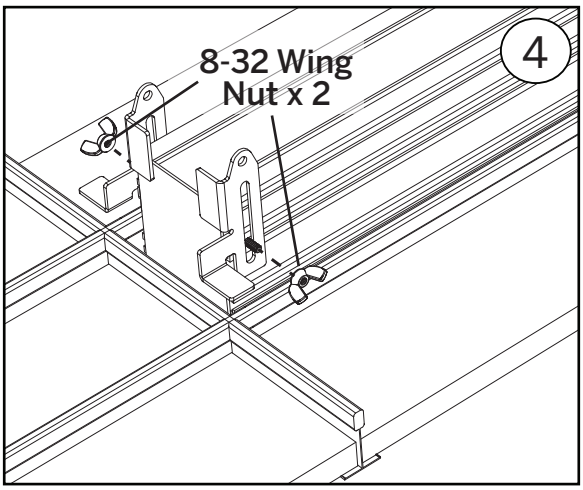
(Removing adjacent ceiling tiles is necessary to install fixture.)

11.1 LINEAR FIXTURE INSTALLATION: GRID (Continued)

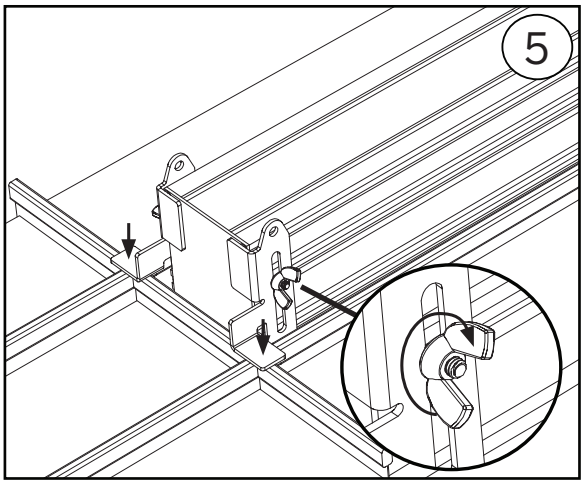
Fixture Bracket Mounting



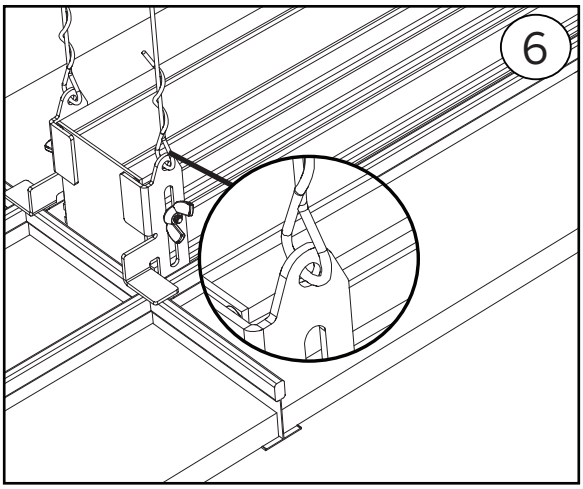
Insert 8-32 weld studs into housing channels (further from trim flange). Then place left and right mounting brackets onto housing with weld stud thread through slot.



Slide mounting bracket flanges against top of ceiling grid. Secure mounting brackets to fixture using 8-32 wing nuts.



With the mounting bracket flanges on top of the ceiling grid, ensure fixture flange sits flush with ceiling substrate. Adjust as necessary and ensure wing nuts are fully tightened.



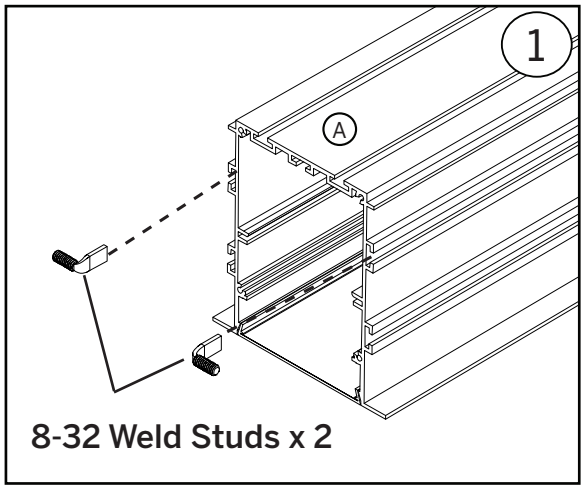
Secure fixture to ceiling above, as shown, using hanger wire (provided by others).

(REPEAT STEPS FOR BOTH ENDS OF FIXTURE)

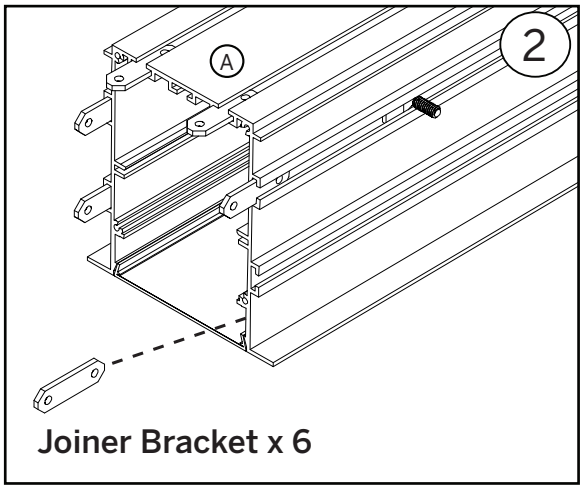
11.1 LINEAR FIXTURE INSTALLATION: GRID (Continued)

Joining Segments Over 4 Foot

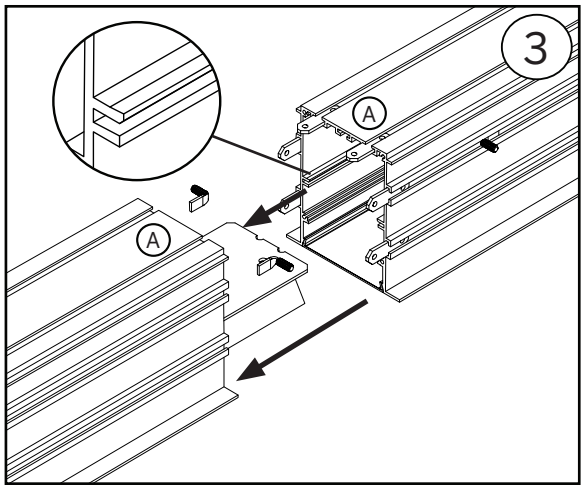
- For lengths over 4 ft, sections must be joined prior to being placed into ceiling.
- Sections shall be joined together matching the letters marked on segments, for example: (A to A) and (B to B).



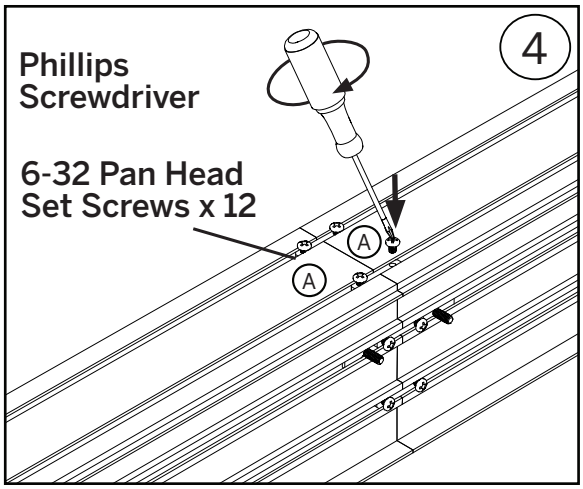
On the first section, slide 8-32 weld studs into the housing channels (further from trim flange).



Insert joiner brackets halfway into all housing channels.



Slide 8-32 weld studs into the second sections housing channels (further from trim flange). Check that the proper housings are being joined (**A to A**). Then slide the two sections together inserting the LED liner into the interior channel. Slide all 6 joiner brackets into the opposite sections channels.

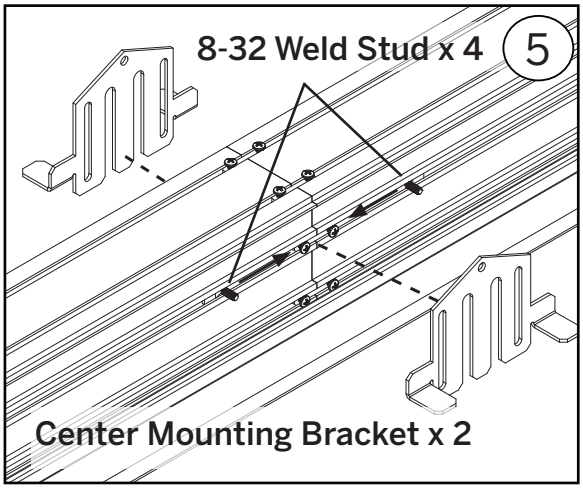


Ensure housing sections and interior LED liners sit flush together. Then check that joiner brackets are centered between both sections. Screw in and tighten pan head set screws into the joiner brackets.

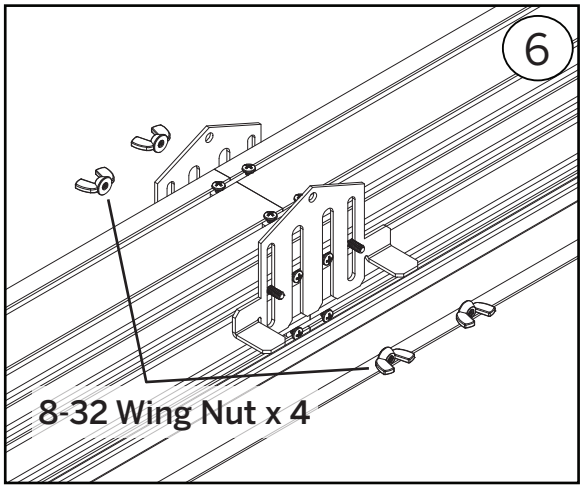
(AFTER SECTIONS ARE JOINED FIXTURE CAN BE INSTALLED INTO CEILING)

11.1 LINEAR FIXTURE INSTALLATION: GRID (Continued)

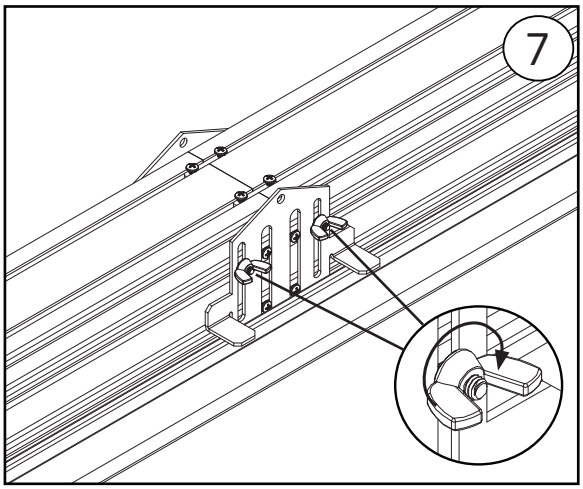
Fixture Bracket Mounting: For Segments Over 4 Foot



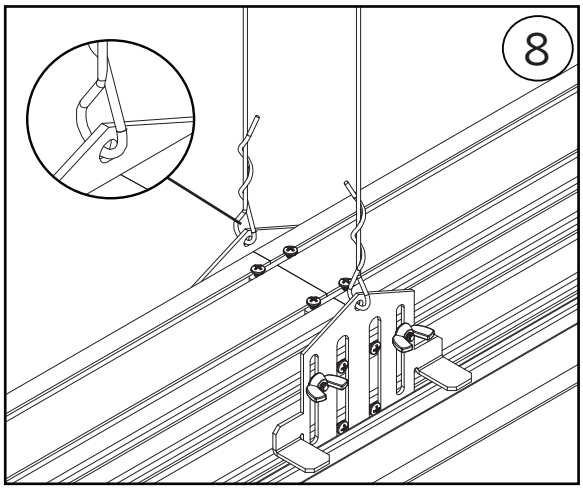
Slide 8-32 weld studs against joiner brackets. Then place center mounting brackets onto housing with weld stud thread through slots.



Slide mounting bracket flanges against top of ceiling grid. Secure mounting brackets to fixture using wing nuts.



With the mounting bracket flanges on top of the ceiling grid, ensure flange trim sits flush with ceiling substrate. Adjust as necessary and ensure wing nuts are fully tightened.

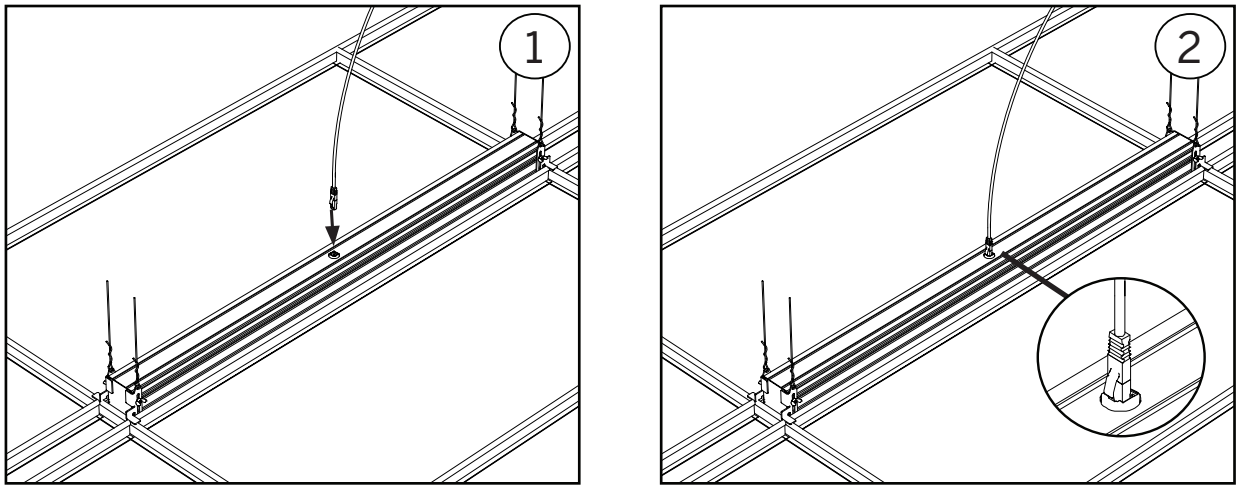


Secure fixture to ceiling above, as shown, using hanger wire (provided by others).

11.1 LINEAR FIXTURE INSTALLATION: GRID (Continued)

Wiring - MRL-02CCM

POWER MUST BE OFF. DO NOT POWER ON UNTIL SYSTEM IS FULLY WIRED!!



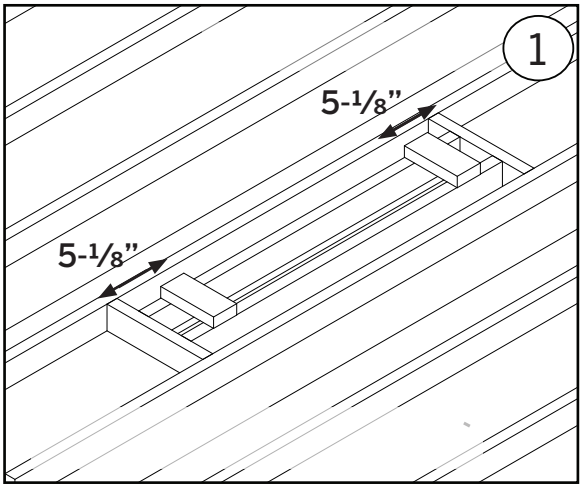
Output Cabling to Fixtures

Total cable length must not exceed 50' from driver to filter and 50' from filter to fixture. Consult factory for longer cable lengths if required.

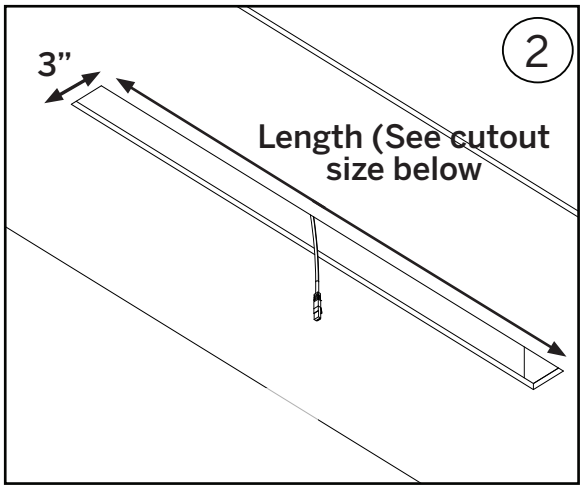
1. Plug shielded MRI power cable into housing.
2. Label power cable with segment length of 2 foot or 4 foot accordingly.
3. Run power cable across plenum to plug-in distribution box.
4. Connect MRL-02CCM segment lengths until total length equals the load description value noted on the plug-in distribution box. **Do not plug or unplug wiring with system powered on.**
5. Use zip ties to mount cables to circuit board for strain relief.

11.2 LINEAR FIXTURE INSTALLATION: NEW CONSTRUCTION

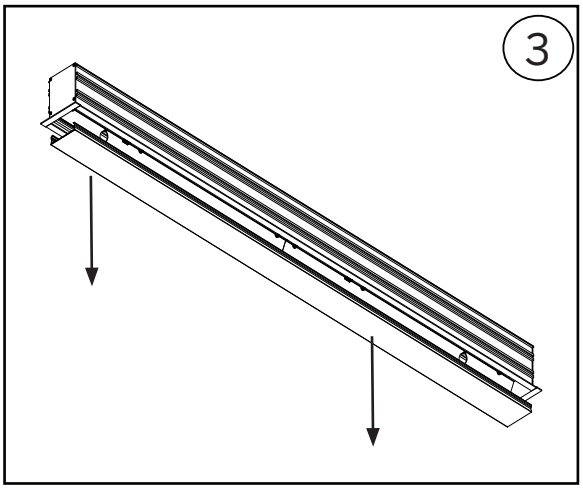
Hard Ceiling/New Construction Configuration



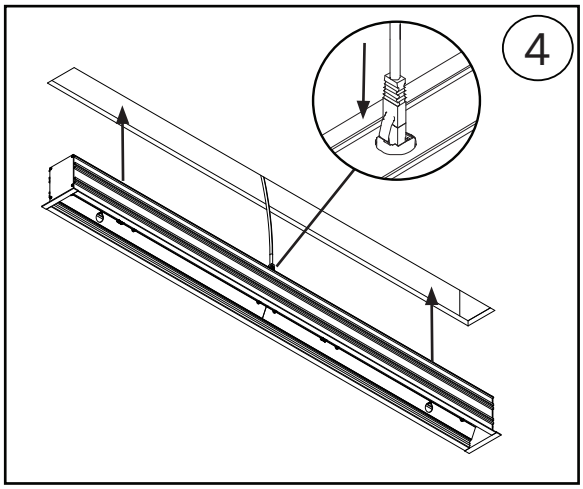
Prepare framing above ceiling. Center of cross members to be **36** 7/8" apart and **5** 1/8" from end of cutout on either side. Route shielded CAT 5e cable through framing to allow access from below.



Per fixture length, install drywall with cutout sizes below. For other lengths, consult factory.
2 FT: **23** 1/8" x 3"
4 FT: **47** 1/8" x 3"
6 FT: **71** 1/8" x 3"
8 FT: **95** 1/8" x 3"
10 FT: **119** 1/8" x 3"
12 FT: **143** 1/8" x 3"
Ensure CAT 5e cable is accessible from below.



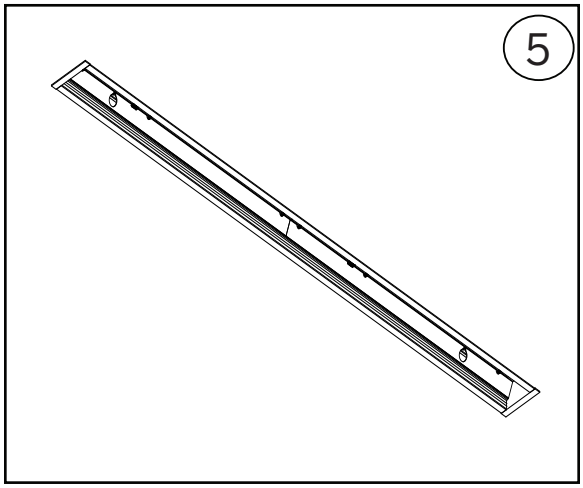
Prior to installing fixture, remove lens with included suction cup tool.



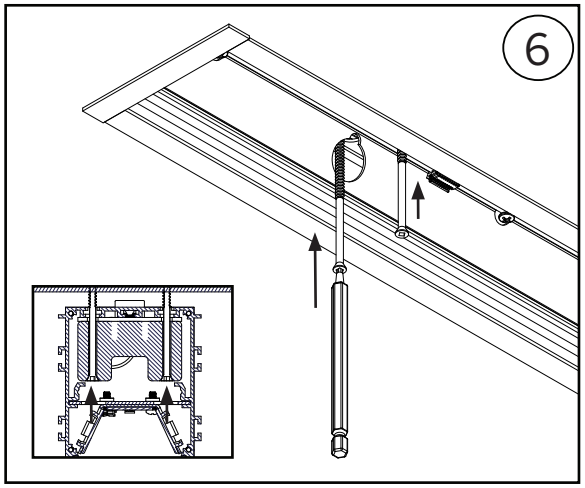
Plug shielded CAT 5e cable into housing from distribution box. Raise fixture into ceiling until trim sits flush against ceiling.

11.2 LINEAR FIXTURE INSTALLATION: NEW CONSTRUCTION (Continued)

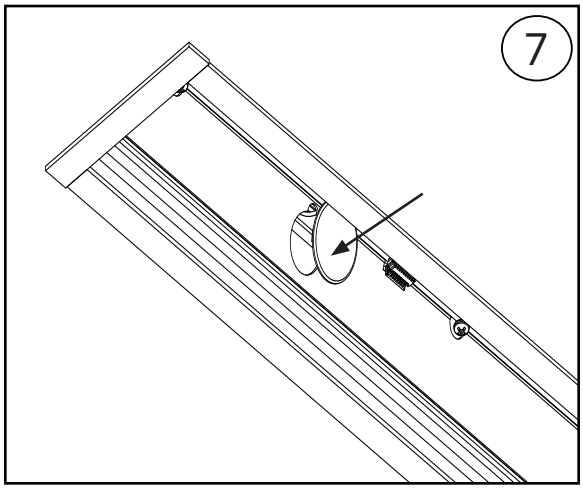
Hard Ceiling/New Construction Configuration



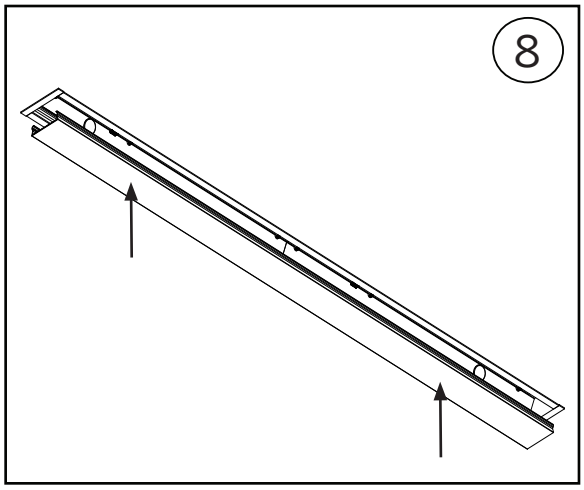
Support fixtures from below, ensuring trim sits flush against ceiling.



Using the included drill bit, install mounting screws into joist through openings in fixture. DO NOT overtighten, otherwise housing may flex.



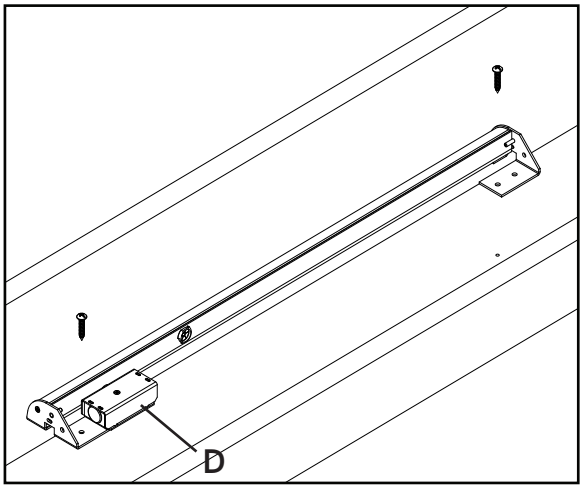
Push included snap-in plugs over each opening in fixture.



Reinstall lens. Ensure lens is fully pressed in along entire length of fixture.

11.3 COVE FIXTURE INSTALLATION

2 Foot Fixture Installation

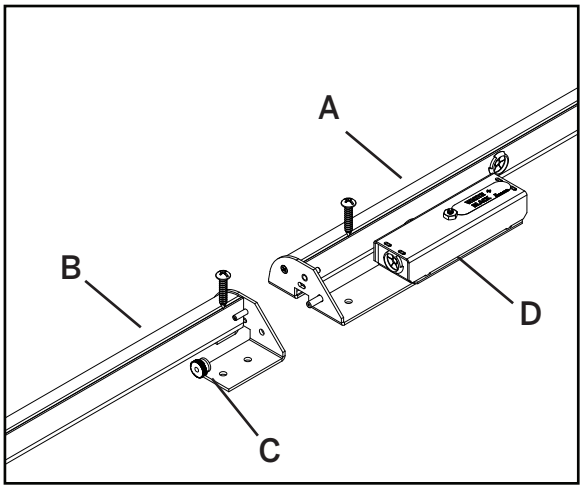


Place the linear cove light where desired in cove.

Drill holes for #8 hardware (supplied by others) and mount linear cove light.

Route input to connector Box (D) per the wiring on the next page.

4 Foot Fixture Installation

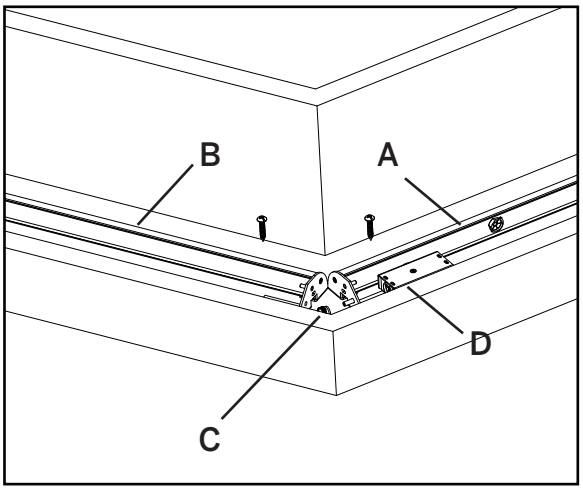


CONTINUOUS APPLICATION

For continuous applications, use the included #8-32 thumb nut (C) to join Fixture A (fixture with a connector box) to Fixture B (fixture without a connector box) if not already joined together.

Drill holes for #8 hardware (supplied by others) and mount the linear cove light.

Route input wiring to the Connector Box (D) per the wiring on the next page.



CORNER APPLICATION

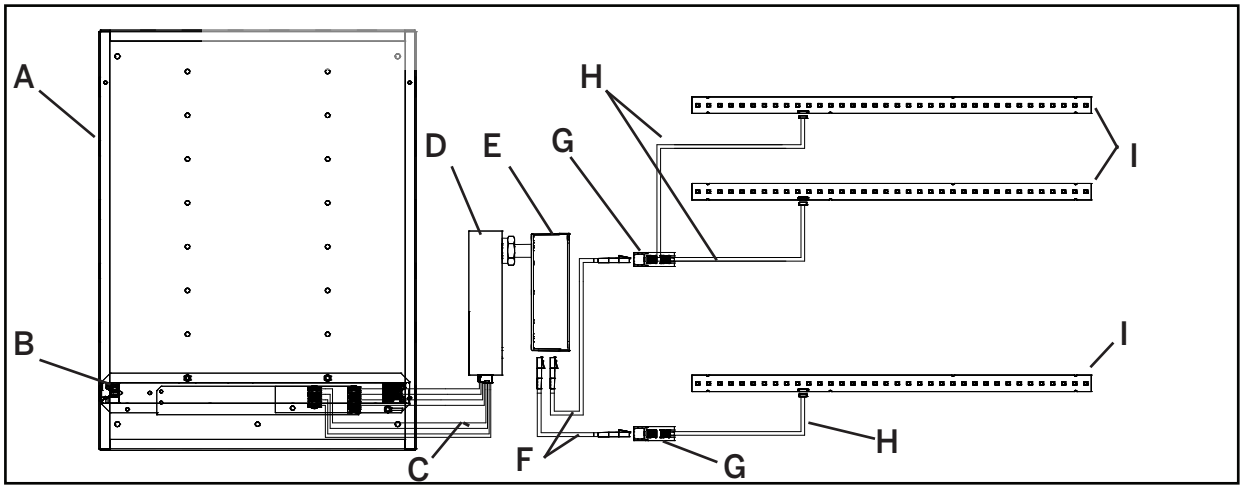
For corner applications, remove the included #8-32 thumb nut joining Fixture A (fixture with a connector box) to Fixture B (fixture without a connector box) and discard.

Drill holes for #8 hardware (supplied by others) and mount the linear cove light.

Route input wiring to the Connector Box (D) per the wiring on the next page.

11.3 COVE FIXTURE INSTALLATION (Continued)

Color-Changing Wiring Details



A. Driver Cabinet

B. SmartLED DMX Driver Module

C. 16 AWG twisted pair shielded wire

D. RFI-4100D MRI Filter

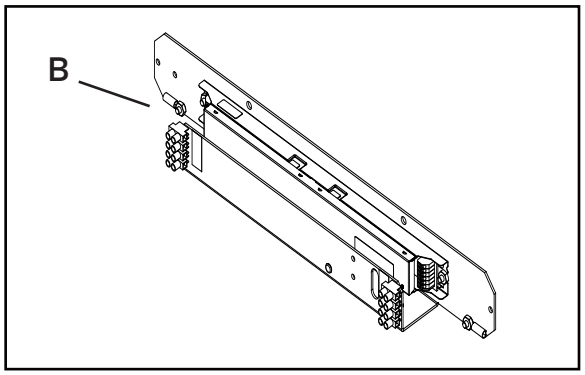
E. PDB-04 Distribution Box

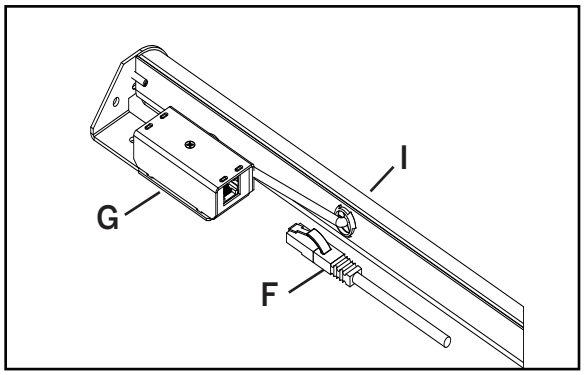
F. RJ45 Cable

G. RJ45 Connector Board and Box

H. RGBW Cable Assembly

I. RGBW Linear Fixture





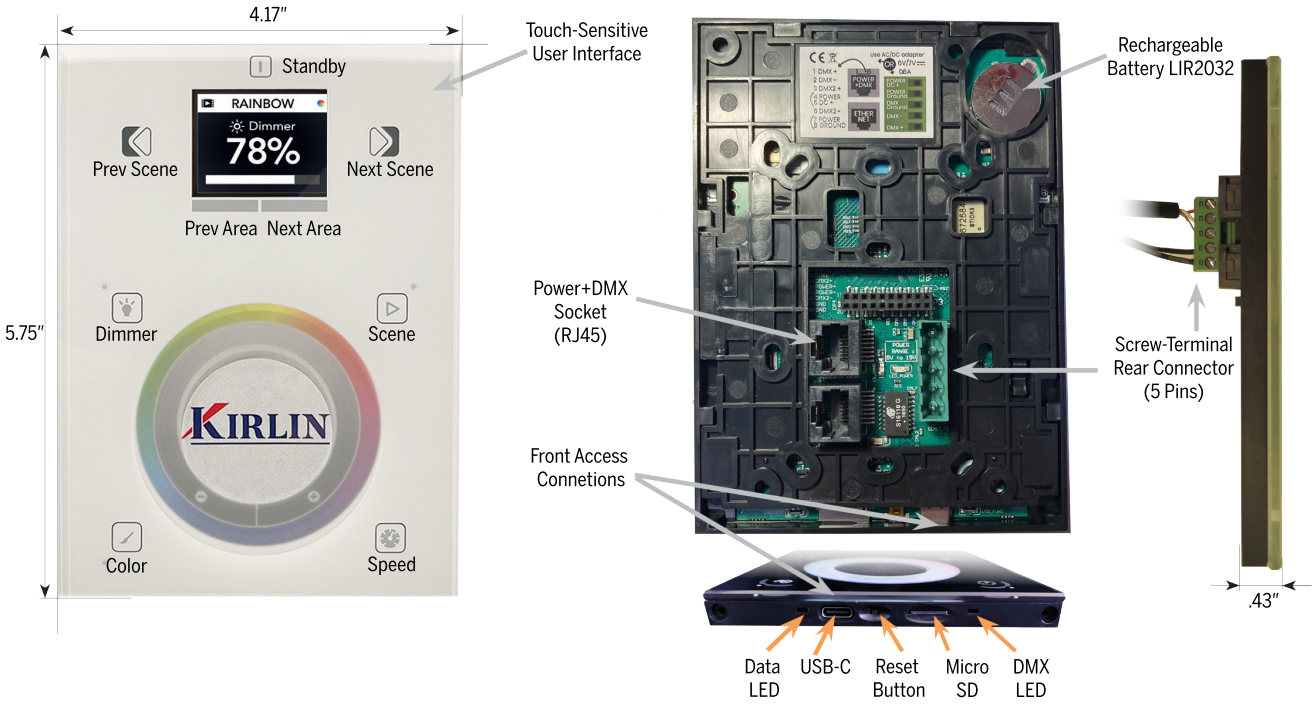
Do not move the wire or fixture while energized.

Disconnect the power to fixture prior to handling.

Discharge any static prior to handling.

12.0 DMX CONTROLLER INSTALLATION & WIRING

MRI-DMXWP Overview



MRI-DMXWP Installation

The MRI DMX System is pre-configured with 6 preset scenes without additional commissioning. For other programming options, consult factory.

The system has 2 DMX failure modes that should be noted:

1. If the system powers on with no DMX signal, the output of all connected light fixtures will be 100%.
2. If the system is on and then DMX signal fails, the output of all connected light fixtures will be their last state.

MRI-DMXWP Installation Steps

1. **Electrical Box Selection** - The controller can be installed in any standard electrical back box. If you use a double size box, you can insert the power supply inside.

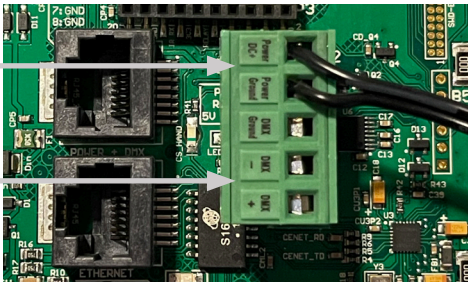
   Note: We recommend against installing against a metal wall or surface as this can cause issues with the touch buttons.

12.0 DMX CONTROLLER INSTALLATION & WIRING (Continued)

MRI-DMXWP Installation Steps (Continued)

2. **Mount Electrical Box Per Code Requirements** - Controller cannot be installed inside MRI suite.

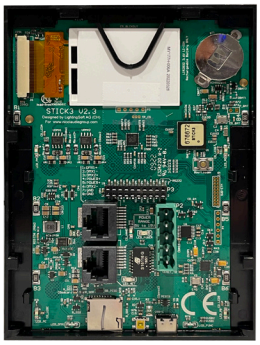
3. **Connect the Wires**



Power: Connect the included power supply. Be sure to not invert the **+** and the **ground**.

DMX: Connect one end of the DMX cable to the controller and the other end to the DMX input header in the MRI-DMXPS cabinet.

4. **Mount the Interface on the Wall** - First, mount the back plate of the interface to the wall with 2 or more screws.



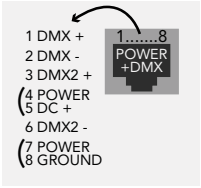
Secondly, connect the connectors:
- DMX and power (green connector block)
- Tuck wiring into junction box so any excess wiring is recessed.

The front panel is mounted by pressing it against the back plate and then sliding down.

Note: Power should not be turned on until the controller is securely in place.

Power +DMX with the Connector Block

Power +DMX with the RJ45 Cable



CHECK PIN CONFIGURATIONS. APPLYING POWER TO THE DMX INPUT WILL DAMAGE THE CONTROLLER!!

MAKE SURE THE CONTROLLER IS MOUNTED WITHOUT TOO MUCH FORCE BEHIND AS THIS CAN PUSH APART THE GLASS!!

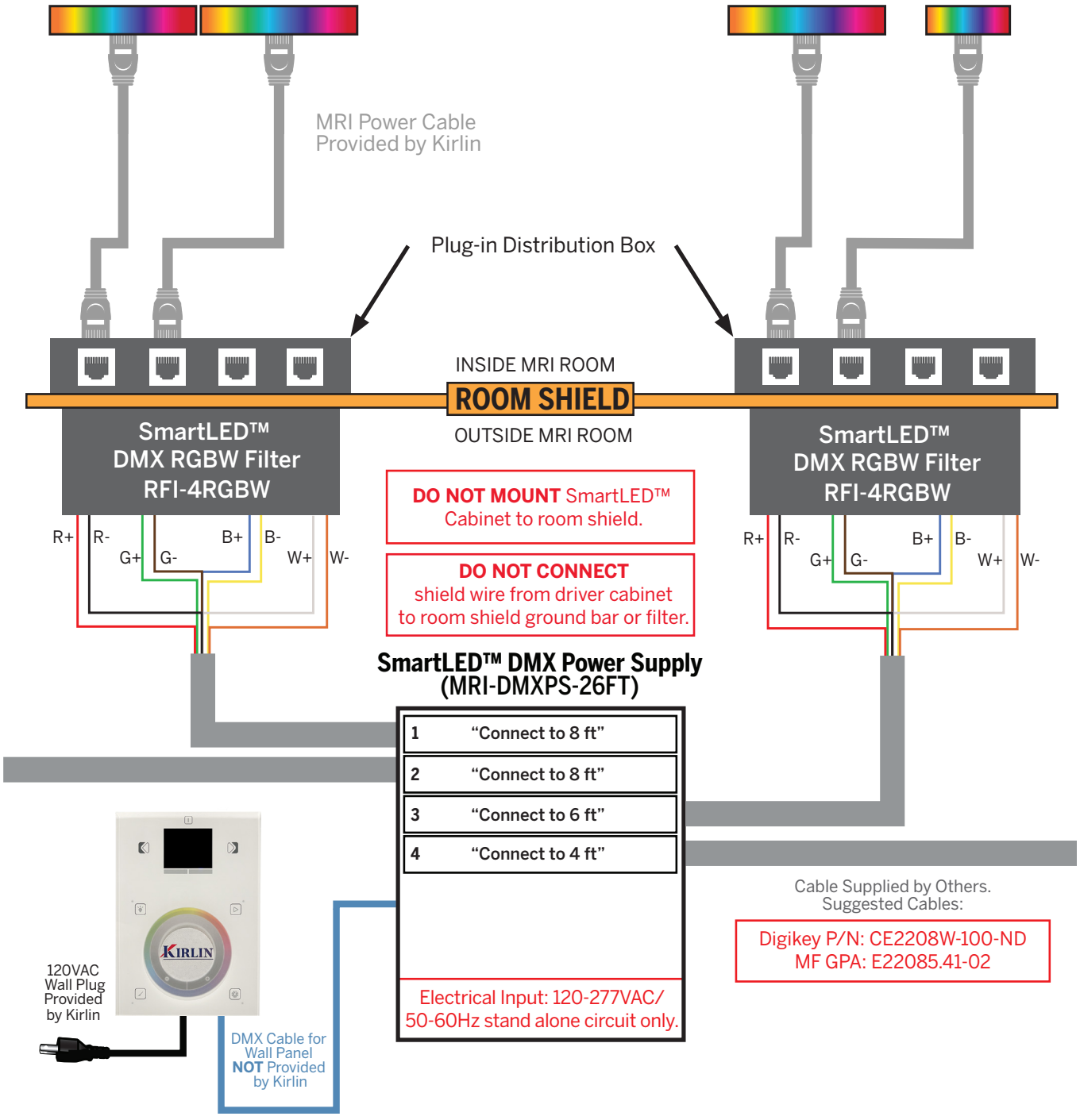
13.0 SYSTEM WIRING/EXAMPLES: Linear Fixtures Only

DO NOT CONNECT
LED luminaries to energized system.

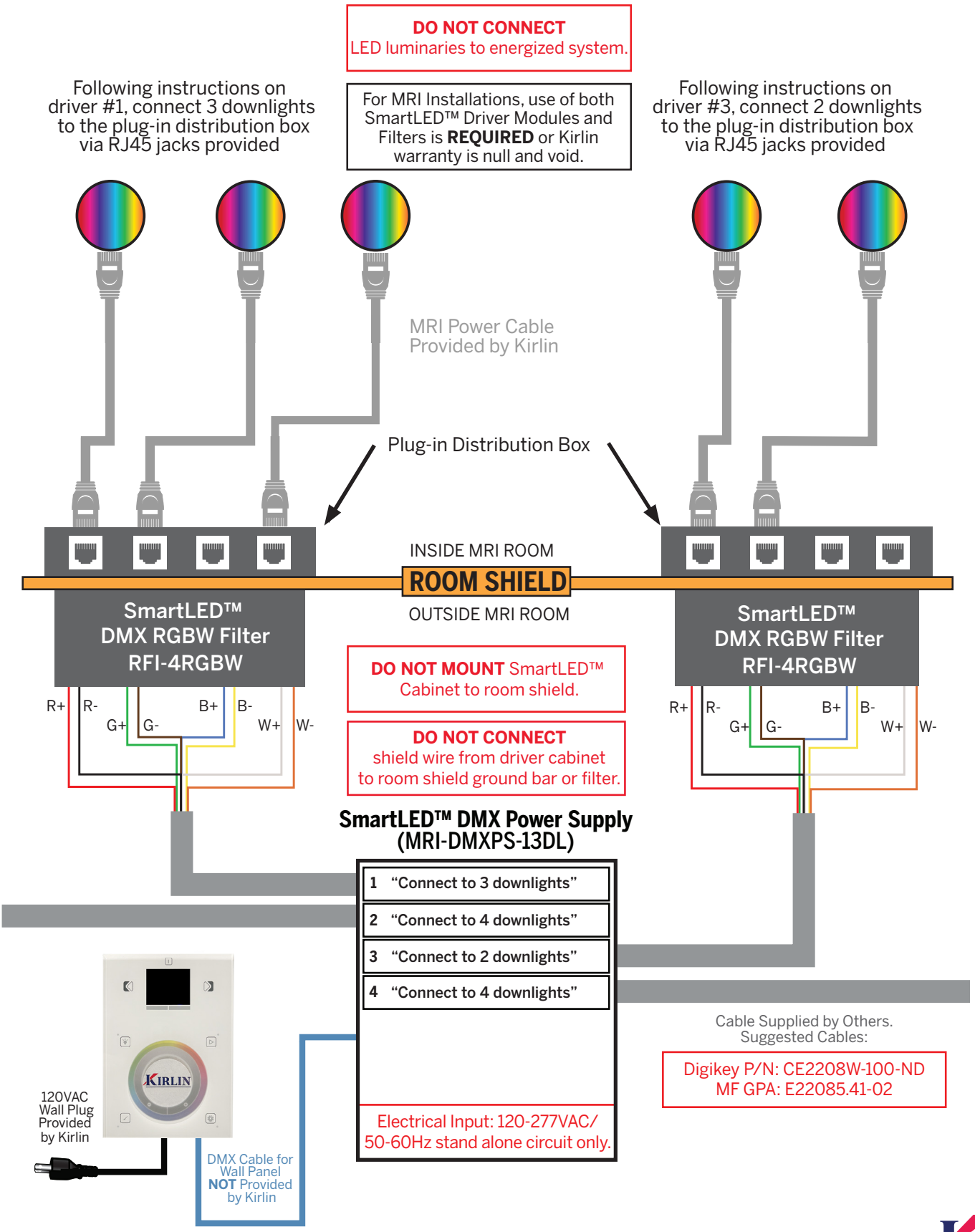
For MRI Installations, use of both SmartLED™ Driver Modules and Filters is **REQUIRED** or Kirlin warranty is null and void.

Following instructions on driver #1, connect 8 feet of fixture length (4 feet + 4 feet) to the plug-in distribution box via RJ45 jacks provided

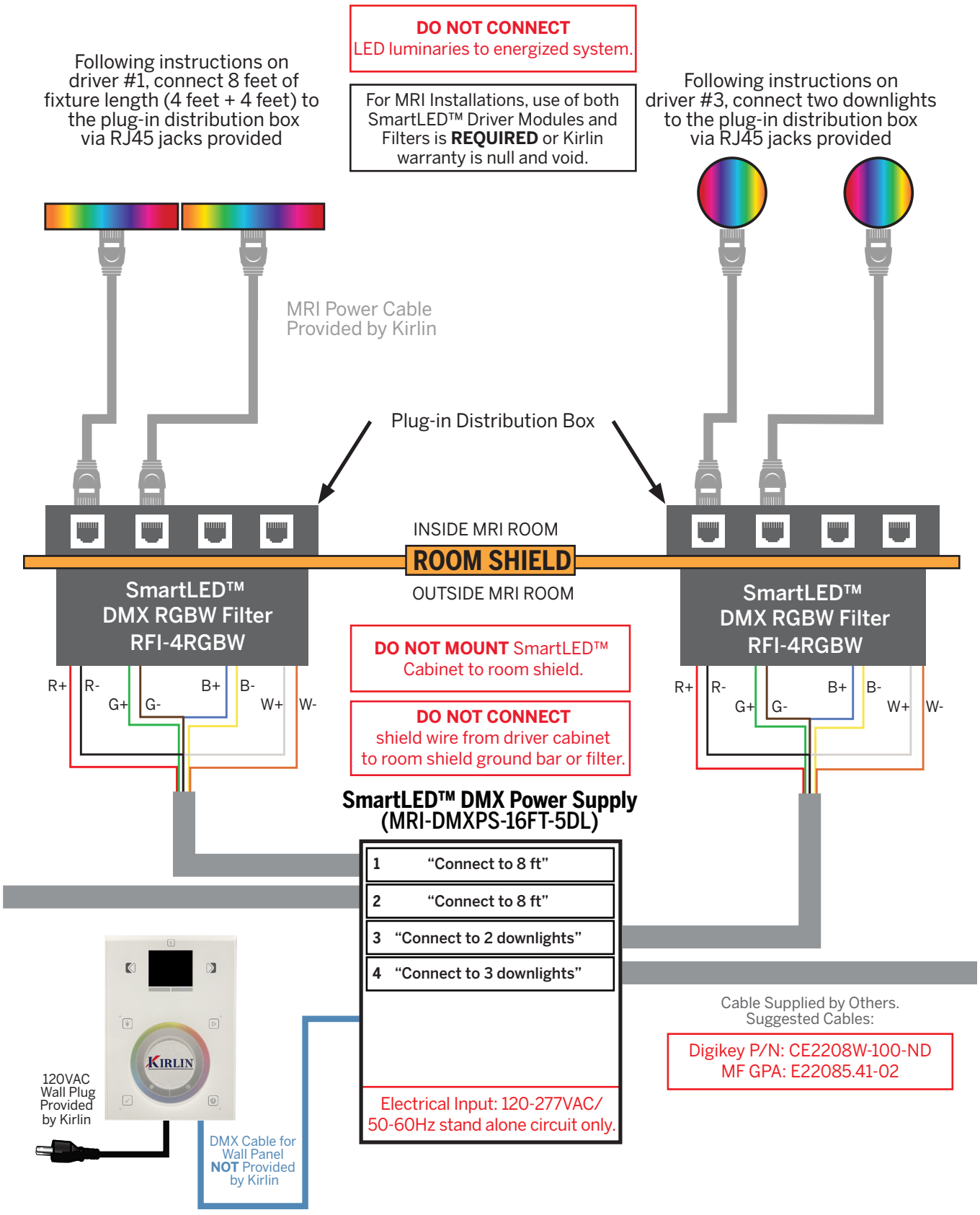
Following instructions on driver #3, connect 6 feet of fixture length (4 feet + 2 feet) to the plug-in distribution box via RJ45 jacks provided



13.0 SYSTEM WIRING/EXAMPLES: Downlights, Cylinders, Sconces Only



13.0 SYSTEM WIRING/EXAMPLES: Linear Fixtures and Downlights



14.0 TROUBLESHOOTING

Fixtures Do Not Illuminate

1. Verify that a valid DMX controller is connected and operating properly. If the system was turned off by a DMX controller and then DMX signal fails, the fixtures will stay at the last state. The system will also yield full output if powered on with no DMX signal. Disconnecting DMX input and output wires at the terminal blocks and power cycling the system for 1 minute will determine if the system is operating properly.
2. Verify that the system is powered on. Use of an AC volt meter can be used to verify proper line voltage at the MRI-DMXPS cabinet.
3. Confirm that all input and output connections are correct and secure.
4. Verify that the number of fixtures per plug-in distribution box and wiring connections are correct per diagram located on panel cover or section 13.0 of this manual.

Fixtures Are On, But Can't Change Output

1. Verify that DMX controller is connected and operating properly. If the system DMX signal fails, the fixtures will stay at the last state. The system will also yield full output if powered on with no DMX signal. Disconnecting DMX input and output wires at the terminal blocks and power cycling the system for 1 minute will determine if the system is operating properly.
2. Verify all wiring and connections are correct per diagram located on panel cover or section 13.0 of this manual.

Fixtures Are Pulsing, Strobing or Flickering

1. Confirm the installed parts are approved Kirlin parts.
2. Check all wire connections. The most common reason for pulsing/strobing fixtures is a loose wire connection.
3. Verify that the included MRI power cable is used and properly connected.
4. Confirm that the supply line to the system is a dedicated circuit (all fixtures flickering at the same time).

For additional assistance, contact factory at 313.259.6400.

15.0 USER NOTES