



Installation Guide/Owner's Manual

Technical Support: 313-259-6400, Press 5

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INSTALLATION GUIDE/OWNER'S MANUAL

1.0 SCOPE

The KIRLIN SmartLED™ system is intended for installation and use with an MRI system. The system includes a SmartLED™ MRI Cabinet, SmartLED™ Driver Module, SmartLED™ Filter, and SmartLED™ 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 RESPONSIBILITIES

It is the responsibility of the contractor, installer, buyer, owner and user to install, maintain, and operate the KIRLIN SmartLED™ 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.

3.0 SAFETY REQUIREMENTS & IMPORTANT INFORMATION



Risk of electrical shock. May result in serious injury or death. Disconnect power before servicing or installing.



The SmartLED™ driver module may only be connected and installed by a qualified electrician. All applicable regulations, legislation, and building codes must be observed. Incorrect installation of the LED driver can cause irreparable damage to the SmartLED™ driver module, filter and the connected LEDs.

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



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



Must use Kirlin supplied driver modules, filters, and light fixtures to maintain warranty.



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



Wire shields **INSIDE** room **MUST** be connected to room shield grounding bar; **DO NOT CONNECT** wire shields to the fixtures.



Wire shields **OUTSIDE** room **MUST** be connected to driver module GND; **DO NOT CONNECT** wire shields to room shield or to filter.



Unused filter channel output wires should be individually capped.



The maximum wire length from the cabinet to light fixture is 100 feet.

4.0 INPUT ELECTRICAL SPECIFICATION (Per Installed DVR Module)

| | |
|---------------------------------|--|
| 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 | < 200mA ² s @ 120V / 60Hz < 200mA ² s @ 277V / 60Hz |
| Surge protection | 2kV differential mode (DM) 2kV common mode (CM) |
| Maximum standby power | 0.5W |

4.1 ELECTRICAL SPECIFICATION (Per Filter Channel)

| Electrical Specifications | | | |
|---------------------------|--|----|--------------|
| Voltage | | 60 | Vdc max. |
| Current | | 3 | Amps max. |
| Turn on delay | Time required for stabilization of all outputs | 2 | Sec. typical |

5.0 STANDARDS & COMPLIANCE (Per Installed DVR Module)

| | |
|---|--|
| 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 |
| 0-10V | IES/EN 60929 annex E NOTE: From 0.6V to 10V drivers comply with IEC/EN 60929 annex E. Below 0.6V SmartLED™ driver modules comply with ABL 0-10V Design Spec v1.2 enabling standby mode. |
| Surge protection | ANSI 62.41 1991 category B1: 2.5kV DM, 2.5kV CM @ 30 Ohm 0-10V input 0.5kv DM, 1kV CM surge |
| Restriction of hazardous substances | RoHS3 (Directives 2011/65/EU-2015/863/EU) |

6.0 DIMMING CONTROL CHARACTERISTICS

| | |
|------------------|------------------|
| Control protocol | 0-10V |
| Dimming range | 100% - 0.4%, off |
| Dimming curve | Linear |

7.0 ENVIRONMENTAL CONDITIONS

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

| | |
|---|-------------------|
| Module operating ambient temperature (Ta) range | -20°C to +50°C |
| Filter operating ambient temperature (Ta) range | -10°C to +60°C |
| Acoustic noise - steady state | < 24dBa (Class A) |
| All components | Dry location only |

8.0 CABINET & MODULE INSTALLATION

Before you begin

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

Electrical requirements

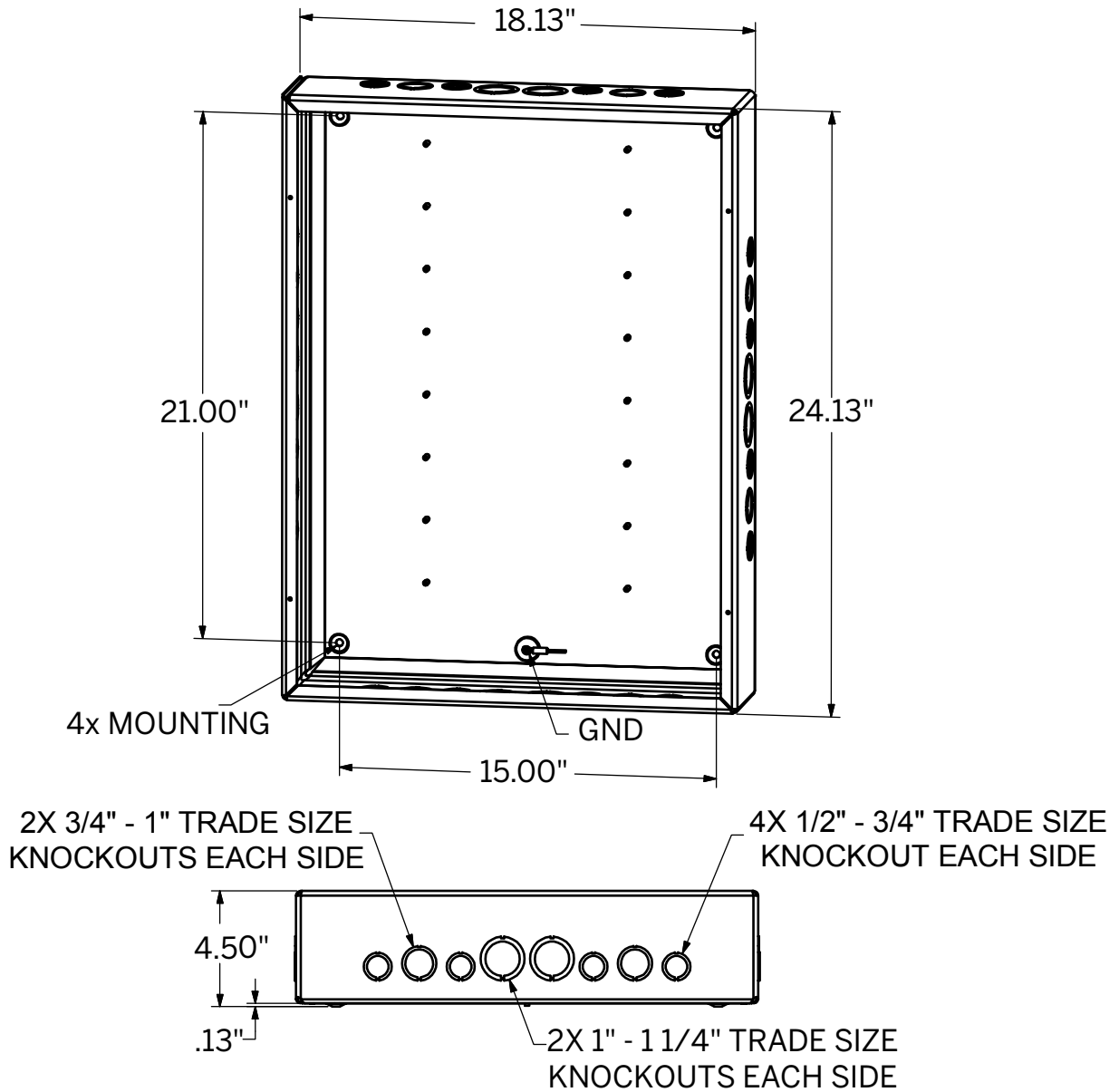
- This driver cabinet is intended for connection to a 20A branch circuit and an appropriate disconnect device shall be provided as part of the building installation.
- All secondary output circuits are class 2 low voltage.

Mounting and environmental requirements

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

8.0 CABINET & MODULE INSTALLATION (continued)

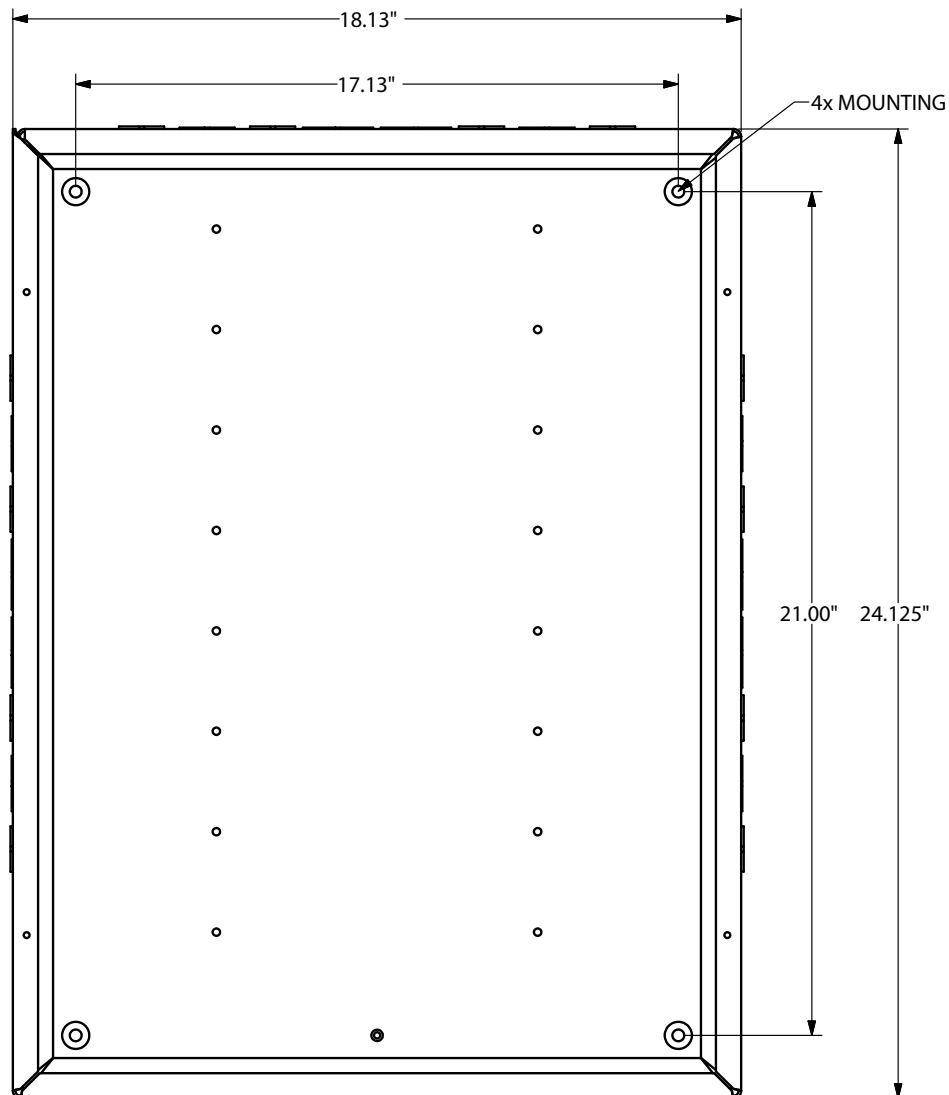
Mechanical detail



8.0 CABINET & MODULE INSTALLATION (continued)

Mounting cabinet

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



8.0 CABINET & MODULE INSTALLATION (continued)

Install modules

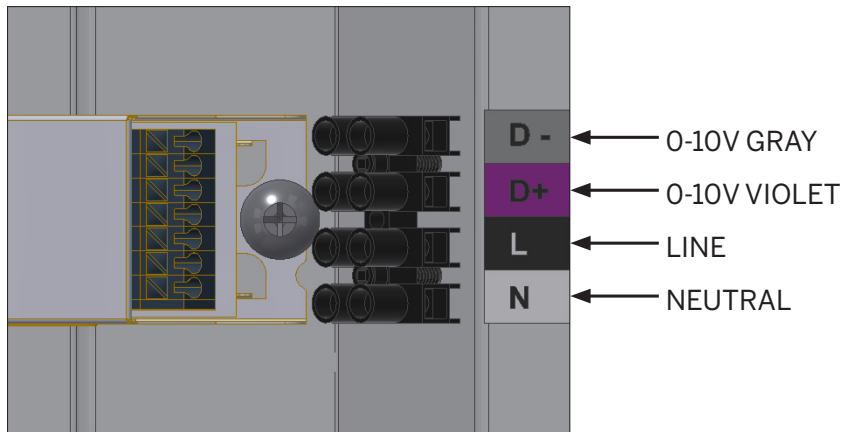
1. Each module is mounted in the cabinet via two threaded studs. Remove the keps-nuts installed on each stud, insert module, and replace both keps-nuts.
2. Repeat for each module to be installed.



8.0 CABINET & MODULE INSTALLATION (continued)

Input connections

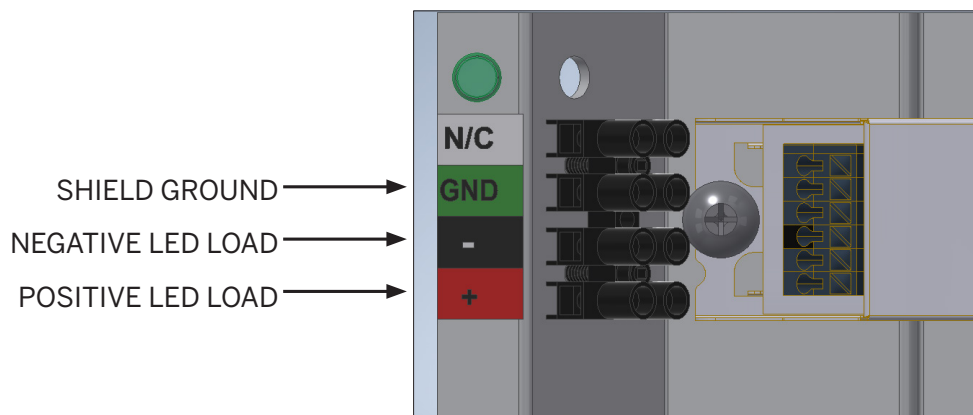
NOTE: Each cabinet ships with a jumper wire kit to allow fast & easy installation. The kit allows installer to customize dimming & switching zones by daisy chaining modules as needed. All system wiring must have a UL electrical rating of 300V minimum.



1. Install the AC line through the desired knock-out in the cabinet.
2. Install the 0-10V dimming wires in the desired knock-out in the cabinet.
3. Connect the AC Line and Neutral wires to the terminal block as shown.
4. Connect the AC Ground wire to the supplied green ground wire located in the cabinet.
5. Connect the 0-10V Violet and Gray dimming wires.

Output connections

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

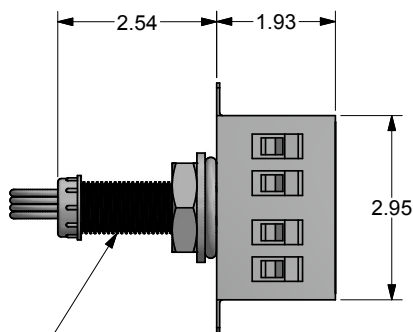


1. Install the LED load wires through the desired knock-out in the cabinet.
2. Connect the twisted shielded pair wires to the terminal block as shown.
DO NOT connect the shield wire at the other end of the run.

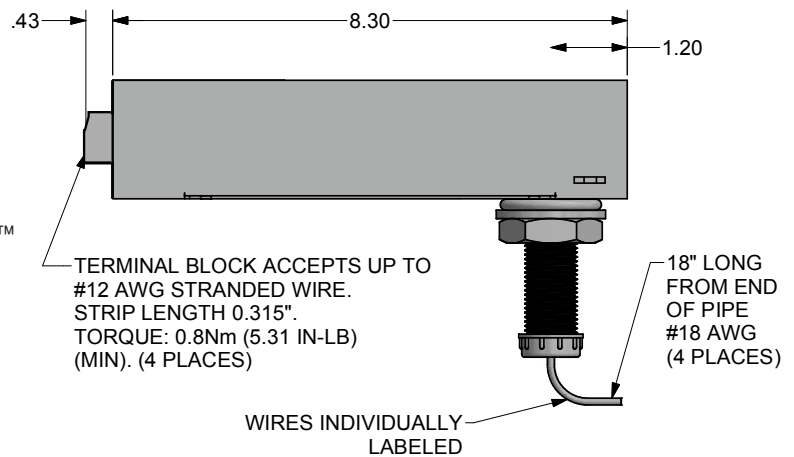
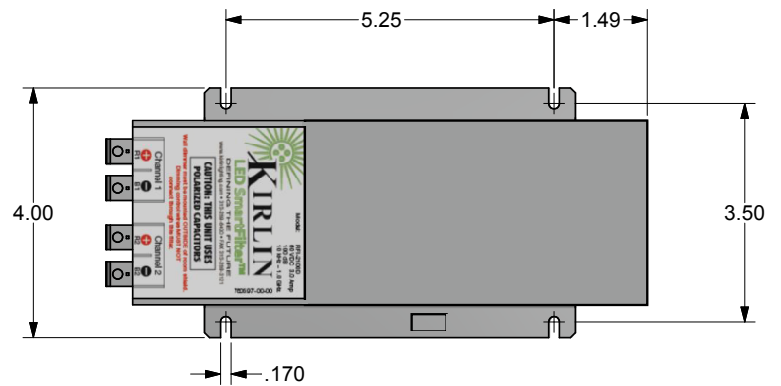
9.0 FILTER INSTALLATION

The filter is installed on the exterior of the room shield. It is electrically inserted between the driver module and the light fixture(s).

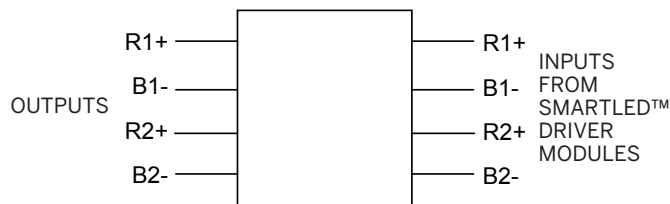
9.1 Dimensions: RFI-2100D (2-channel filter)



1/2" NPSM THREADED CONDUIT SUPPLIED WITH GASKET, WASHER AND MOUNTING NUT

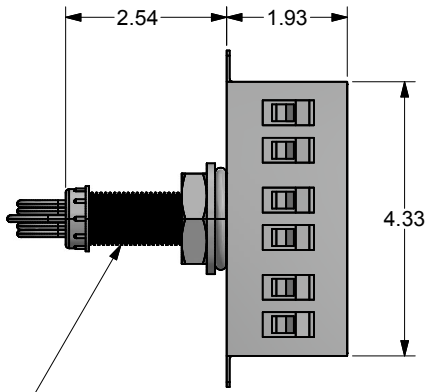


ELECTRICAL SCHEMATIC

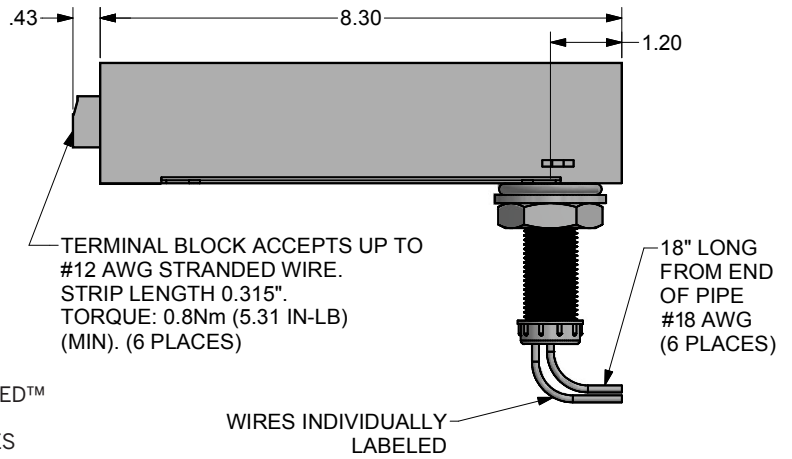
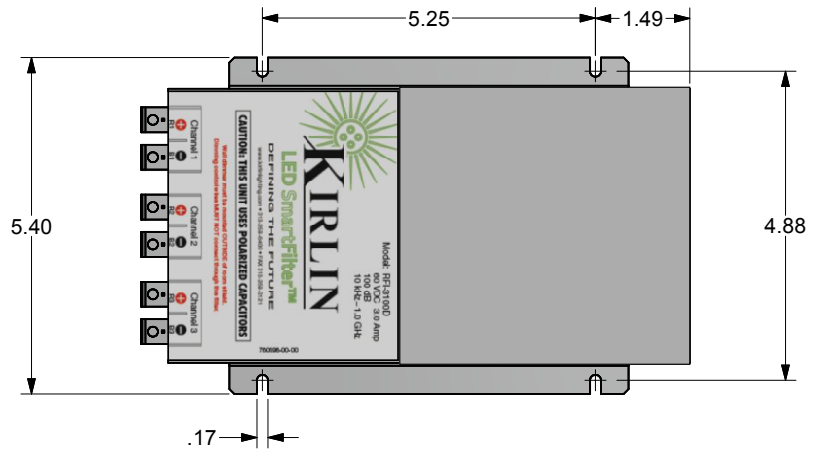


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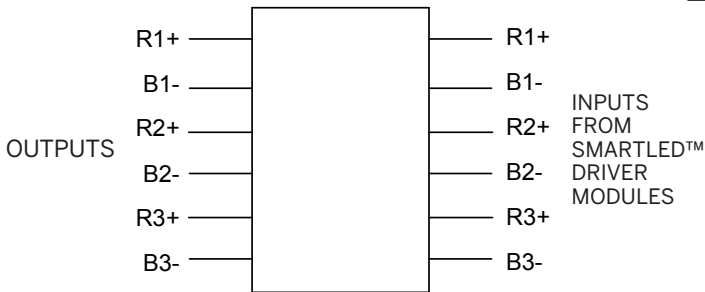
9.2 Dimensions: RFI-3100D (3-channel filter)



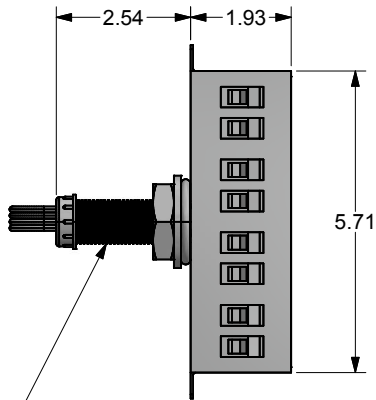
1/2" NPSM THREADED CONDUIT SUPPLIED WITH GASKET, WASHER AND MOUNTING NUT



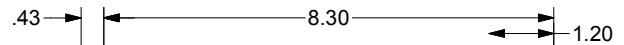
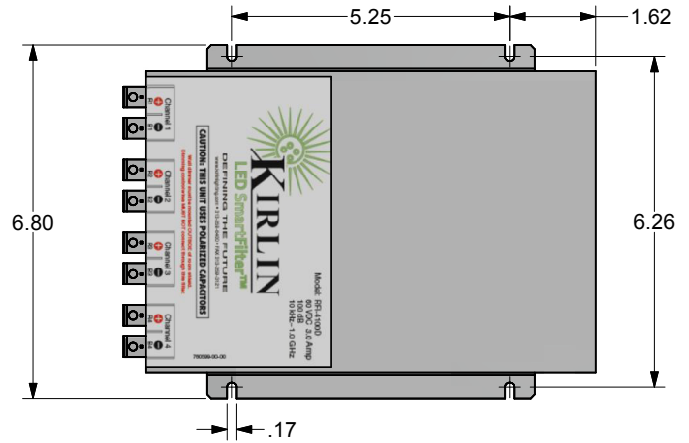
ELECTRICAL SCHEMATIC



9.3 Dimensions: RFI-4100D (4-channel filter)



1/2" NPSM THREADED CONDUIT SUPPLIED WITH GASKET, WASHER AND MOUNTING NUT

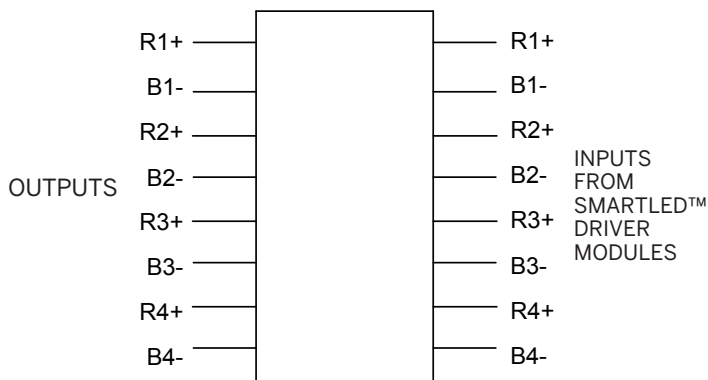


TERMINAL BLOCK ACCEPTS #12 AWG STRANDED WIRE. STRIP LENGTH 0.315". TORQUE: 0.8Nm (5.31 IN-LB) (MIN). (8 PLACES)

18" LONG FROM END OF PIPE #18 AWG (8 PLACES)

WIRES INDIVIDUALLY LABELED

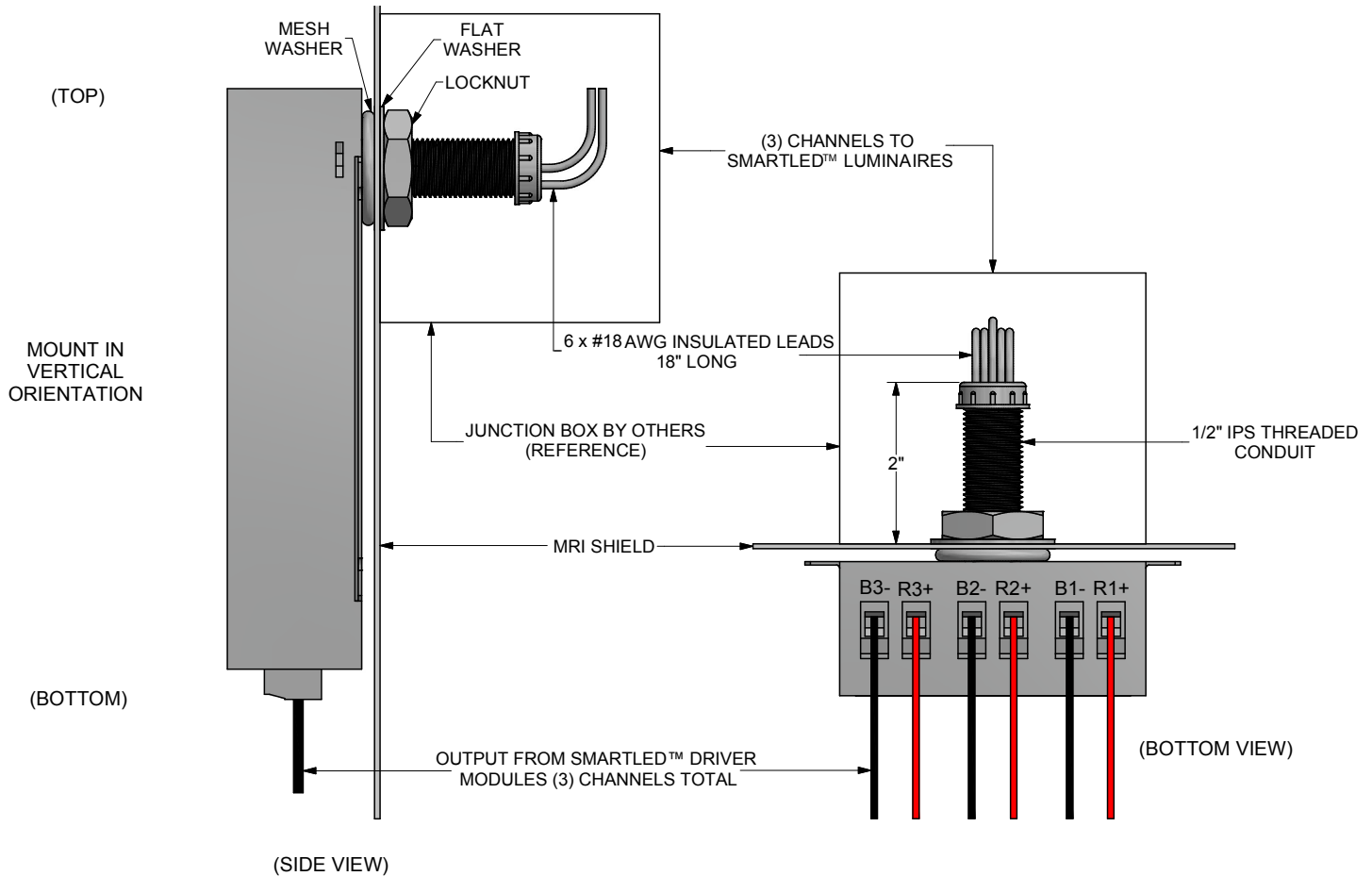
ELECTRICAL SCHEMATIC



OUTPUTS

INPUTS FROM SMARTLED™ DRIVER MODULES

9.4 TYPICAL MOUNTING EXAMPLE: RFI-3100D



9.5 INPUT REQUIREMENTS

- **WARNING: DO NOT** connect wire/cable shields **OUTSIDE** of MRI room to room shield grounding bar or to filter.
- This filter unit is intended for connection to a branch circuit provided from a Kirlin SmartLED™ MRI Driver Cabinet **ONLY. DO NOT** connect this filter to any branch circuit other than a SmartLED™ Driver Module 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.

9.6 CHANNEL CONNECTIONS TABLE

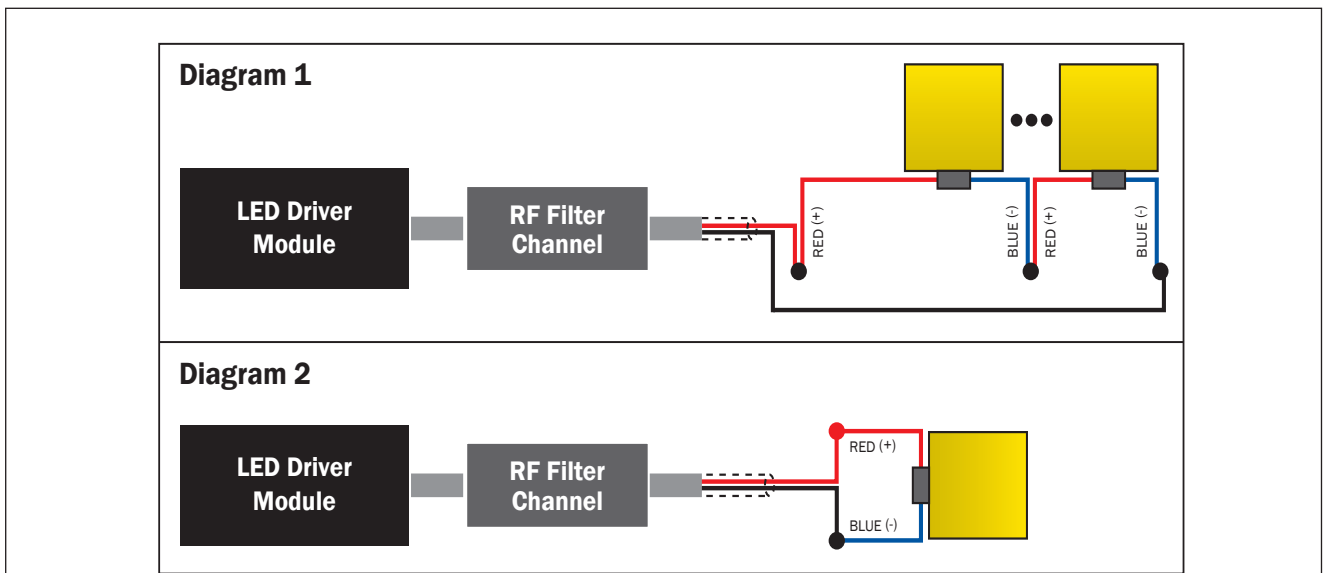
| Model | | Channel | Polarity | Wire Color | Wire Marking | |
|-----------|-----------|-----------|----------|------------|--------------|-----|
| RFI-4100D | RFI-3100D | RFI-2100D | 1 | + | Red | R1+ |
| | | | | - | Black | B1- |
| | | 2 | + | Red | R2+ | |
| | | | - | Black | B2- | |
| | | 3 | + | Red | R3+ | |
| | | | - | Black | B3- | |
| | | 4 | + | Red | R4+ | |
| | | | - | Black | B4- | |

9.7 OUTPUT CABLING TO FIXTURES

Output cabling must be #18 AWG (minimum) twisted pair shielded wire to minimize cross talk between channels and minimize Electromagnetic Interference (EMI).

10.0 LED LOAD CONFIGURATIONS

| Description | LED Driver Module | |
|---------------------------------------|---------------------------------|-------------------------------|
| | DVR-1400A | DVR-0700A |
| -1500L Recessed Fixture | Up to 2 in series (Diagram 1) | |
| -2500L Recessed Fixture | 1 per driver module (Diagram 2) | |
| 2' x 2' Panel: Scenic or White -1500L | | Up to 2 in series (Diagram 1) |
| 2' x 2' Panel: White -2500L | 1 per driver module (Diagram 2) | |



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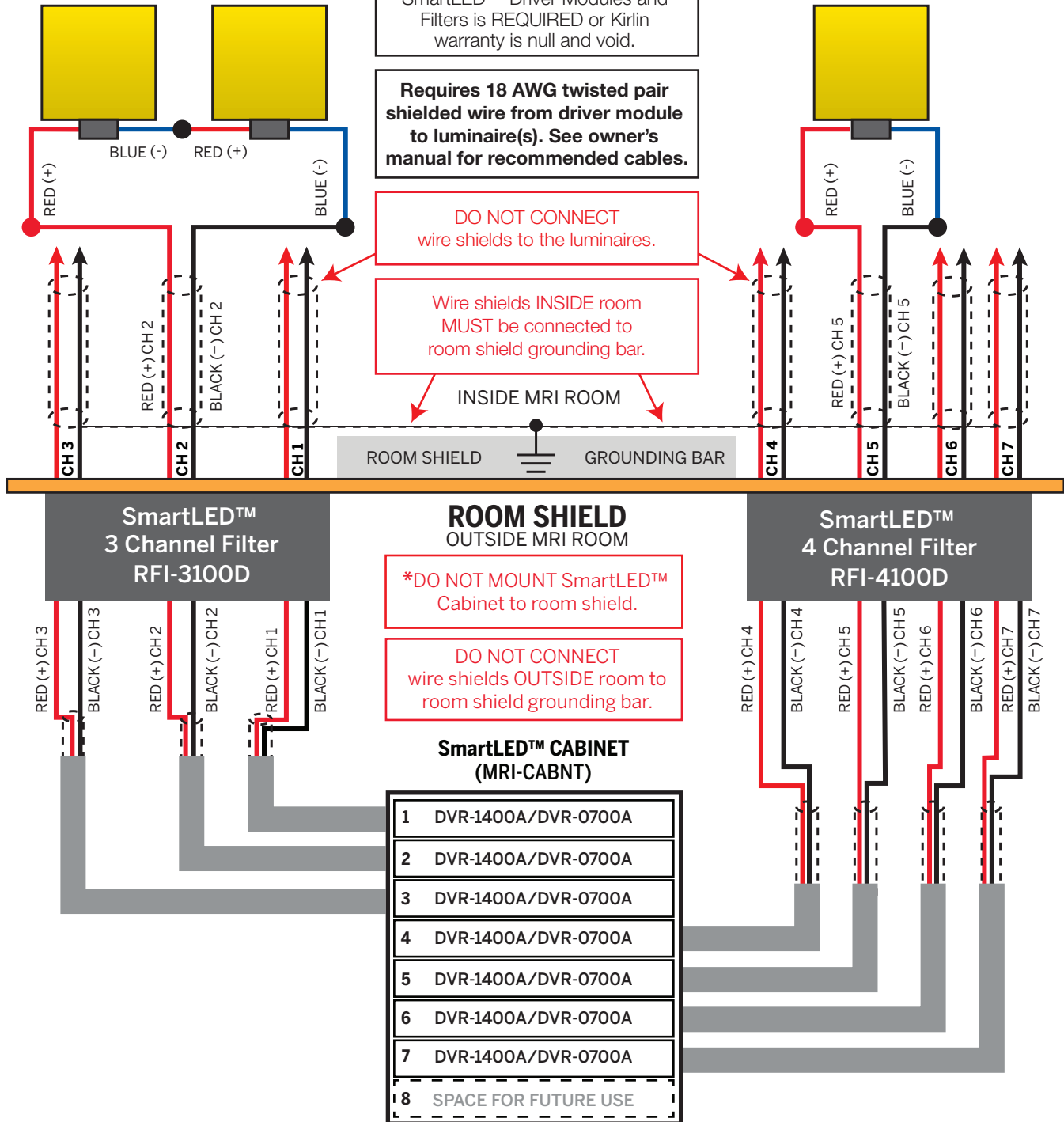
11.0 WIRING EXAMPLE

Two **1500L** luminaires in series on one circuit (use DVR-1400A).

Two **scenic** or **1500L** panels in series on one circuit (use DVR-0700A).

One **1500L** or **2500L** luminaire on one circuit (use DVR-1400A).

One **2500L** white panel on one circuit (use DVR-1400A).



Electrical Input: 120-277VAC / 50-60Hz stand alone circuit only.

12.0 COMPATIBLE 0-10V DIMMERS & CONTROLS

| COMPATIBLE 0-10V DIMMERS and SWITCHES | | |
|---------------------------------------|--|---------------|
| Dimmer Manufacturer | Type | Dimming Curve |
| Busch-Jaeger | 2112U-101 | Logarithmic |
| Jung | 240-10 | Logarithmic |
| Leviton Lighting Controls | IllumaTech - IP710-DLZ / IP710-LFZ | Logarithmic |
| Lightolier Controls | ZP600FAM120 | Logarithmic |
| Lutron Electronics | Diva: DVTV, DVSTV, NFTV /Nova-T; NTSTV | Linear |
| Merten | 5729 | Logarithmic |
| Pass & Seymour | CD4FB-W | Logarithmic |
| The Watt Stopper | DCLV1 | Logarithmic |
| Sensor Switch | n O EZ | Linear |
| Synergy | ISD BC | Logarithmic |

| COMPATIBLE DIMMING CONTROL SYSTEMS | |
|------------------------------------|---|
| Control Manufacturer | Type |
| Lutron Electronics | GraphicEye - GRX-TVI w GRX3503, Linear Energy Savr Node - QSN-4T16-S, TVM2 Module |
| Crestron | GLX-DIMFLV8, GLXP-DIMFLV8, GLPAC-DIMFLV4-*, GLPAC-DIMFLV8-*, GLPP-DIMFLVEX-PM, GLPP-1DIMFLV2EX- PM, GLPP-1DIMFLV3EX-PM, DIN-AO8, DIN-4DIMFLV4, CLS-EXP-DIMFLV, CLCI-1DIMFLV2EX |
| ABB | SD/S 2.16.1 |

Note: Some dimmers may cause reduced stability at the lowest dim level setting; this is normal and maybe resolved by increasing the lowest dim level setting if your selected dimmer allows

13.0 OUTPUT WIRE REQUIREMENTS and RECOMMENDATIONS

ALL WIRES MUST BE: #18 AWG minimum, twisted pair shielded with drain wire, UL rated for 300V

| RECOMMENDED WIRE | | | | | |
|-----------------------|---------|-----------------|------------------------|---------|-------------|
| CMP Versions (PLENUM) | | | CM Versions (OPEN AIR) | | |
| Belden | #18 AWG | Part # 82760 | Belden | #18 AWG | Part # 8760 |
| Belden | #16 AWG | Part # 83702 | Belden | #16 AWG | Part # 8719 |
| ADC | #18 AWG | Part # 911802SD | | | |
| ADC | #16 AWG | Part # 911602SD | | | |

14.0 INVERTER CONNECTIONS

EMI-03120

The **EMI-03120** will power up to 3 DVR modules during a power failure. Please see the installation manual supplied with the **EMI-03120** for its specific wiring diagrams.

EMI-21220

The **EMI-21220** will power up to 8 DVR modules during a power failure. Please see the installation manual supplied with the **EMI-21220** for its specific wiring diagrams.

15.0 TROUBLESHOOTING

Fixtures Do Not Illuminate

1. Check to make certain that the dimmer is not set to its lowest position (depending on dimmer module, the system may dim to “off”).
2. Verify that the cabinet is powered on. Each module has an LED indicator that will illuminate continuously when power is applied.
3. Confirm the installed RFI filter(s) are approved Kirlin parts. Use of any other filter without factory approval is not recommended and may void warranty.
4. Confirm that all input and output connections are correct and secure. RFI filters and all wiring from the driver module to the LED fixture(s) is polarized; reversed connections may result in filter and/or LED light failure.
5. Verify that the number of fixtures per module and wiring connections are correct per diagram located on panel cover or section 11.0 of this manual.
6. Disconnect the LED fixture(s) not illuminating at the fixture junction box. Use a DC volt meter to measure the voltage at the fixture, filter output, filter input, and driver module. Voltages should be approximately 55VDC. Lower voltages may indicate a short in the wiring or a failed driver module.

Fixtures Are Pulsing, Strobing or Flickering

1. Confirm the installed RFI filter(s) are approved Kirlin parts. Use of any other filter without factory approval is not recommended and may void warranty.
2. Check all wire connections. The most common reason for pulsing / strobing fixtures is a loose wire connection.
3. Verify that #18 AWG (minimum) twisted pair shielded wire is used and properly grounded.
4. Verify the installed 0-10V dimmer is approved for use in section 12.0 of the owner's manual. Note: Some dimmers may cause reduced stability at the lowest dim level setting; this is normal and maybe resolved by increasing the lowest dim level setting if your selected dimmer allows.
5. Confirm that the supply line to the cabinet is a dedicated circuit (all fixtures flickering at the same time).

15.0 TROUBLESHOOTING (continued)

Fixtures Do Not Dim (Full Output Only)

1. Verify the installed 0-10V dimmer is approved for use in section 12.0 of the owner's manual.
Note: Some dimmers may cause reduced stability at the lowest dim level setting; this is normal and maybe resolved by increasing the lowest dim level setting if your selected dimmer allows.
2. Check all dimming wire connections for a disconnected splice or open connection.

Fixtures Are Stuck in Dim (Low Output Only)

1. Verify the installed 0-10V dimmer is approved for use in section 12.0 of the owner's manual.
Note: Some dimmers may cause reduced stability at the lowest dim level setting; this is normal and maybe resolved by increasing the lowest dim level setting if your selected dimmer allows.
2. Check all dimming wire connections for a short between the violet and gray wire or a reversed connection.

16.0 USER NOTES

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