

## Energi Savr Node PRO LED+ Phase Adaptive

The Energi Savr Node (ESN) family is a group of modular products for the control of lighting and other loads.

This document describes the following product:

QSN-4A5-S: 4-Zone ESN for phase control dimming of lighting loads

- Can be used in a QS Standalone system with an iOS Energi Savr Application.
- Can be used in an Athena system.
- Can be used in a Quantum system with version 3.4.321 and later.\*

### Features

- 120/277 V~ Universal voltage phase control dimming for all phase control load types.
- Includes QS link for seamless integration of lights and controls.
- An auto-detect mode is supported to detect and configure forward-phase or reverse-phase dimming for incandescent/halogen, electronic/magnetic low-voltage and neon/cold cathode light sources.
- A locked forward-phase or reverse-phase mode is available.
- Controls dimmable LED loads. Refer to [www.lutron.com/ledtool](http://www.lutron.com/ledtool) for compatibility with dimmable LED light sources.
- NEMA SSL 7A-2015 compliant for compatibility with solid state lighting.
- RTISS technology compensates for incoming line-voltage variations such as changes in Root Mean Square (RMS) voltage, frequency shifts (up to ± 2% change in frequency/second), harmonics and line noise.
- RTISS-ICM technology is able to withstand high-inrush LEDs, bulb blowouts, and direct shorts.
- RTISS-TE technology allows for true instantaneous voltage compensation for incoming line-voltage variations. Only operates in reverse-phase when "voltage-comp." is enabled. Note: Not supported in QS Standalone.
- Provides air gap off (when all zones are off).



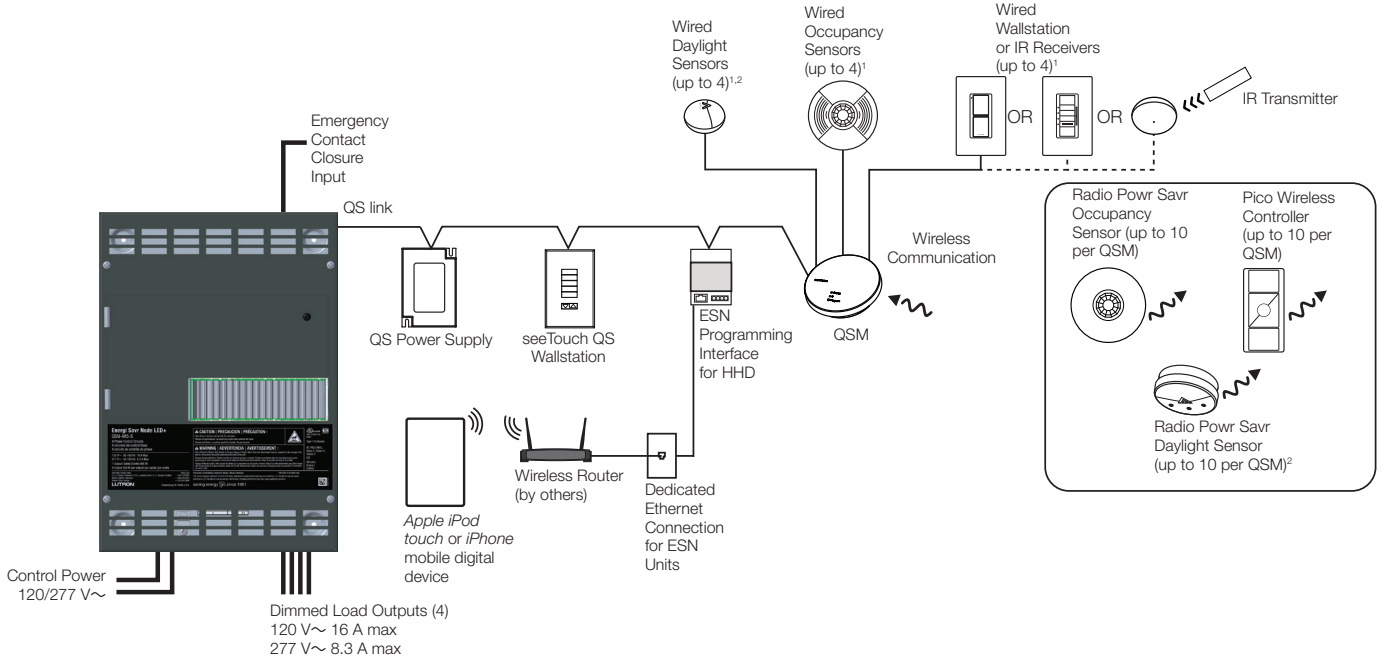
QSN-4A5-S

- Integral protection for common temporary over-current and over-voltage conditions.
- LEDs on the module provide diagnostic information.
- Buttons on the module provide override control.
- Emergency contact closure input (CCI).
- Evaluated by UL for use in emergency lighting systems in accordance with UL924 when paired with a LUT-ELI-3PH (UL® file E234628).
- Power failure memory automatically returns the outputs to the levels they were set to prior to a power outage.
- Bypass jumper provided to easily verify load wiring before connecting loads to outputs (see page 12).

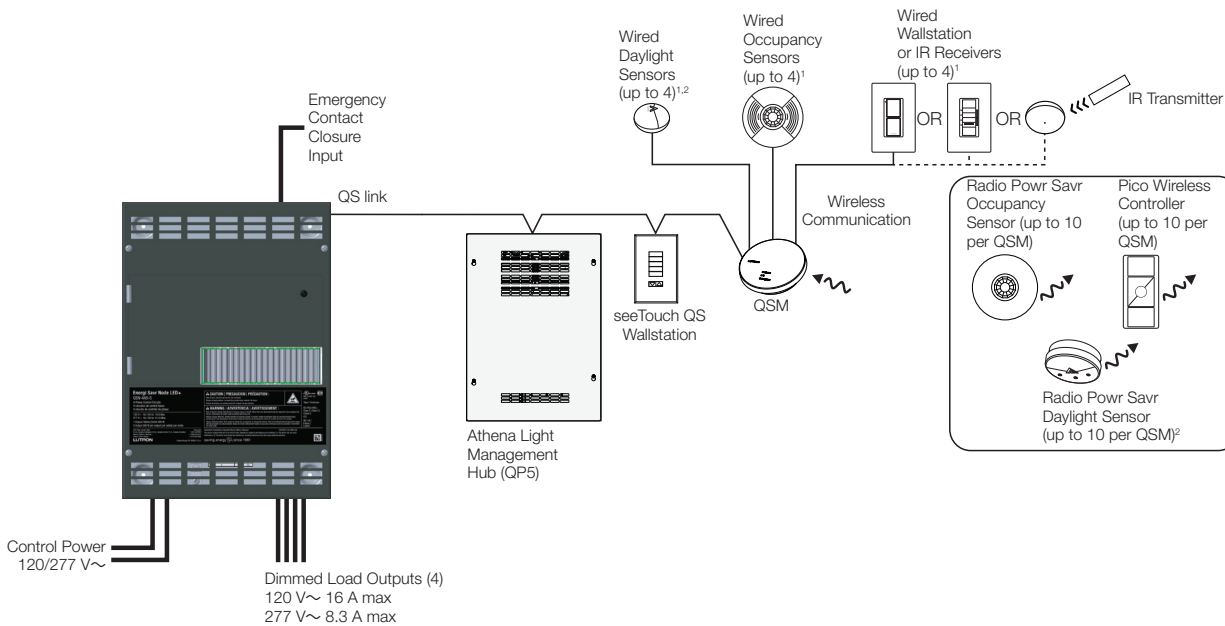
\* Note: Quantum systems lower than 3.4.321 will require a billable upgrade to the latest version of Quantum. Contact your local Lutron Representative for more information.

<b>Job Name:</b>	<b>Model Numbers:</b>
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### QS Standalone Example



### System Example



**Notes:**

- 1 Up to 4 wired sensors total (of any type) per QSM.
- 2 The maximum number of daylight sensors (wired and wireless) that an ESN unit can support is four (1 per zone).

Job Name:	Model Numbers:
Job Number:	

## Specifications

### Power

- 120 V~ 50/60 Hz, 16 A maximum total input current
- 277 V~ 50/60 Hz, 8.3 A maximum total input current
- Lightning strike protection meets ANSI/IEEE standard 62.31-1980. Can withstand voltage surges of up to 6000 V and current surges of up to 3000 A.

### Regulatory Approvals

- Lutron Quality Systems registered to ISO 9001.2015
- cULus Listed
- NOM Certified
- ICES-5(A)/NMB-5(A)
- FCC Class A
- NEMA SSL 7A-2015
- Complies with requirements for use in other spaces used for environmental air (plenums) per NEC® 2014 300.22(C)(3)
- Meets the Canadian National Building Code plenum requirements for a concealed space used as a plenum within a floor or roof assembly

### Environment

- See **Mounting** on page 8 for thermal specifications.
- Relative humidity: less than 90% non-condensing.
- For indoor 32 °F to 104 °F (0 °C to 40 °C) ambient use only.

### Output Zone Ratings

- Each zone has no minimum load requirement.
- When programmed to "auto detect" mode, the zone starts in reverse-phase and if an incompatible load is detected, it will convert to forward-phase.
- Internal relay provides an air gap off when all zones are off.
- One load type per zone.

- Output must not be used to control receptacles. If controlling plug-in lamps, installation must ensure a method of preventing non-rated loads being plugged into the unit. An example is a dedicated receptacle with an alternate plug load such as a Duplex Dimming Receptacle (NTR-15-DDTR-) and Dimming Lamp Plug (RP-FDU-10-).
- Output must be directly connected to the load.
- Output breakers or switches must not be used.
- Run a separate neutral for each load circuit. A common neutral connection is not recommended.
- Unit may be powered by an Arc Fault Circuit Interrupter (AFCI). Refer to application note #693 (P/N 048693) at [www.lutron.com](http://www.lutron.com) for more details
- Unit may be powered by a Ground Fault Circuit Interrupter (GFCI) or an Arc Fault Circuit Interrupter (AFCI) if required. If using a GFCI or an AFCI incorporating GFCI protection, maximum wire length between the fixture controller and the load must be less than 100 ft (30 m). Load circuit wiring (from breaker to unit to load) must be run in its own non-metallic conduit, or nuisance tripping may occur.
- For applications requiring 0–10 V<sub>DC</sub> control, use a QSN-4T16-S, a QSN-4T20-S, a QSN2-4T20-S, or a QSN-4A5 with a Ten Volt Interface (GRX-TVI).
- For applications requiring higher wattage ratings, use a power booster (PHPM-PA-120-WH, PHPM-PA-DV-WH, or PHPM-PA-277/DV).
- For dimmable loads only. For applications requiring switching control, use a PHPM-SW-DV-WH interface, a QSN-4S16-S, a QSN-4S20-S, or a QSN2-4S20.
- Works up to the output current rating with all dimmable LED drivers whose inrush current does not exceed NEMA 410-2015 standards for electronic ballast/driver.

Job Name:	Model Numbers:
Job Number:	

## Specifications *(continued)*

### Output Zone Ratings *(continued)*

#### 120 V~ Ratings:

Load Type	Zone 1 Rating (maximum)	Zone 2, 3 and 4 Rating (per zone) (maximum)
LED (reverse-phase) <sup>A</sup>	6.6 A	4.2 A
Lutron Hi-lume A-series LTE <sup>E</sup>	4 A (20 drivers maximum)	3 A (13 drivers maximum)
LED NEMA SSL 7A-2015 (forward-phase) <sup>D</sup>	400 W	200 W
Incandescent/Halogen, ELV	800 W	500 W
Neon/Cold Cathode, MLV <sup>C</sup>	800 VA (525 W <sup>B</sup> )	500 VA (375 W <sup>B</sup> )

#### 277 V~ Ratings:

Load Type	Zone 1 Rating (maximum)	Zone 2, 3 and 4 Rating (per zone) (maximum)
LED (reverse-phase) <sup>A</sup>	2.9 A	1.8 A
Incandescent/Halogen, ELV	800 W	500 W
Neon/Cold Cathode, MLV <sup>C</sup>	800 VA (525 W <sup>B</sup> )	500 VA (375 W <sup>B</sup> )

<sup>A</sup> Works with all dimmable LED drivers whose inrush current does not exceed NEMA410 standards for electronic ballast/drivers. Refer to [www.lutron.com/ledtool](http://www.lutron.com/ledtool) for specific LED compatibility information and recommended LED light sources.

<sup>B</sup> Actual lamp wattage.

<sup>C</sup> Only use iron core transformers intended for use with an electronic switch or dimmer.

<sup>D</sup> Complies with NEMA SSL 7A-2015 when configured to LED forward-phase with low-end trim set to 10% and high-end trim set to 90%.

<sup>E</sup> Load type must be set to forward-phase with low-end trim = 32% and high-end trim = 78%. Setting the proper trim and load type is necessary to ensure optimal performance and 1% dimming capability.

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## Specifications *(continued)*

### Terminals (Torque, wire gauge & type ratings)

- Mains wiring: 5 in-lbs (0.6 N•m)  
14 AWG to 10 AWG (2.5 mm<sup>2</sup> to 4.0 mm<sup>2</sup>)  
(single wire, solid or stranded)
- Zone wiring: 5 in-lbs (0.6 N•m)  
14 AWG to 10 AWG (2.5 mm<sup>2</sup> to 4.0 mm<sup>2</sup>)  
(single wire, solid or stranded)
- CCI wiring: 5 in-lbs (0.6 N•m)  
20 AWG to 10 AWG (0.5 mm<sup>2</sup> to 4.0 mm<sup>2</sup>)  
(single wire, solid or stranded)  
20 AWG to 16 AWG (0.5 mm<sup>2</sup> to 1.5 mm<sup>2</sup>)  
(two wires, solid or stranded)
- QS Link: 5 in-lbs (0.6 N•m)  
**Common (terminal 1):**  
20 AWG to 12 AWG (0.5 mm<sup>2</sup> to 2.5 mm<sup>2</sup>)  
(single wire, solid or stranded)  
22 AWG to 18 AWG (0.25 mm<sup>2</sup> to 1.0 mm<sup>2</sup>)  
(two wires, solid or stranded)  
**Data (terminals 3 and 4):**  
1 pair, twisted and shielded,  
20 AWG to 12 AWG (0.5 mm<sup>2</sup> to 2.5 mm<sup>2</sup>)  
(single wire, solid or stranded)  
22 AWG to 18 AWG (0.25 mm<sup>2</sup> to 1.0 mm<sup>2</sup>)  
(two wires, solid or stranded)

### Emergency Contact Closure Input

- By default, contact closure input from Lutron Emergency Lighting Interface (LUT-ELI-3PH), security, or fire alarm systems turns all zones on to full output when emergency state is detected.
- Emergency contact closure input is normally closed (NC). The ESN unit is shipped with a jumper pre-installed.
- Response of each zone is configurable.
- No operations will be allowed until emergency signal is cleared.
- The attached contact closure device must provide a dry contact closure or solid-state output.
- Input is miswire-protected up to 36 V<sub>DC</sub>.
- Emergency CCI cannot control other ESN units.

## QS Standalone Specifications

### Occupancy Sensors

- Up to 4 wired and 10 wireless occupancy sensors can be connected using a QSM. Refer to the QSM Specification Submittal at [www.lutron.com](http://www.lutron.com) for more information.

### seeTouch QS Controls

- seeTouch QS wallstations can be configured to control ESN unit scenes or zones.
- In zone toggle mode, zone buttons can be assigned to one or more zones on any ESN unit connected to the QS Link.
- In scene mode, wallstations can be assigned to one or more ESN units connected to the QS Link.
- LED indicator displays zone or scene status.

**Table 1: seeTouch QS Wallstation Configurations**

Wallstation Function	# Buttons				
	1	2	3	5	7
Zone Toggle	✓	✓	✓	✓	✓
Scene	1, Off (toggle)	1, Off	1, 2 Off	1-4, Off	N/A

### IR Wallstation or Receiver Input

- Up to four wired wallstations or IR receivers can be assigned when associated with a QSM. Refer to the QSM Specification Submittal at [www.lutron.com](http://www.lutron.com) for more information.

### Daylight Sensors

- Up to four sensors (Lutron wired daylight sensors or Radio Powr Savr daylight sensors) can be assigned when associated with a QSM. Refer to the QSM Specification Submittal at [www.lutron.com](http://www.lutron.com) for more information.

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## QS Standalone Specifications (continued)

### Functionality with GRAFIK Eye QS

- ESN unit follows GRAFIK Eye QS scene activations when associated with the GRAFIK Eye QS.
- ESN unit responds to commands initiated by the GRAFIK Eye QS astronomic time clock when associated with the GRAFIK Eye QS.
- ESN unit operates in afterhours mode when associated with a GRAFIK Eye QS that is in afterhours mode.
- ESN unit supports GRAFIK Eye QS remote zone mapping. Refer to application note #447 (P/N 048447) at [www.lutron.com](http://www.lutron.com) for more details.

### Functionality with QSE-IO

- ESN unit responds to scene commands initiated by the QSE-IO; if the QSE-IO DIP switches have been set to either scene selection mode, zone toggle mode, partition mode, or occupancy sensor mode.

### Functionality with QSE-CI-NWK-E

- Integrate ESN unit with touchscreens, PCs, A/V systems, or other digital systems and devices.
- Recall scenes and set/adjust zone levels.

### QS Link Limits

- ESN unit does not provide Power Draw Units (PDUs) for other QS devices. A QS power supply QSPS-P1-1-35V or other approved QS power supply, must be used to power other low-voltage devices on the QS link.
- Power supply options:
  - QSPS-J-1-50
  - QSPS-DH-1-75 with LUT-8X8
- Refer to the QS Link Power Draw Unit specification submittal (Lutron P/N 369405) for more information concerning PDUs.
- The QS Link can have up to 100 devices and 100 zones.
- Each ESN unit counts as 1 device towards the 100 device limit.
- Each ESN unit counts as 4 zones towards the 100 zone limit.

### QSM (QS Sensor Module)

- Use the QSM to integrate Radio Powr Savr occupancy sensors, Radio Powr Savr daylight sensors, and Pico wireless controllers to control zones on the ESN unit.
- Associate multiple QSMs per ESN unit with *Apple iPod touch* or *iPhone* programming (requires QSE-CI-AP-D and Wi-Fi router). See "Programming Options" for details.
- Assign up to 10 Radio Powr Savr occupancy sensors per ESN unit via QSM.
- Assign up to 4 Radio Powr Savr daylight sensors per ESN unit via QSM.
- Assign up to 10 Pico wireless controllers per ESN unit via QSM.
- The sensors and Pico wireless controllers associated with the QSM should be mounted within 60 ft (18 m) line of sight, or 30 ft (9 m) through walls, of the QSM.
- Wire and power up to 4 wired sensors per QSM
  - Daylight sensors
  - Occupancy sensors
  - Infrared (IR) receivers or wallstations
- Refer to the QSM Specification Submittal for more information.

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Job Number:	

## Out of Box Functionality

This section describes the default functionality when the unit is first installed.

### Emergency Contact Closure Input (CCI)

- When the CCI is open, the unit will enter Emergency Mode, which will turn on all loads to their emergency level and disable control of local zones and QS devices.
- When the CCI is closed or jumpered, zones will return to the settings or levels they were at prior to entering emergency mode.

**Note:** Unit will process any sensor events received while in emergency mode after it exits emergency mode.

### Normal Mode Operation

- By default, each zone is set to an Auto Detect load type with ON and OFF control only. Each zone will turn load ON or OFF until it is configured via unit programming.
- Zone and raise/lower buttons on the unit can be used to:
  - Turn loads ON and OFF.
  - Dim loads up and down after they are configured in the programming utility.

## Programming Options

### QS Standalone Programming

- Requires ESN programming interface (QSE-CI-AP-D).
- Requires compatible iOS programming device using the Energi Savr application. Refer to the Energi Savr Node Handheld Programming Guide (P/N 040384) at [www.lutron.com](http://www.lutron.com)
- Does not support local button programming.

### Athena System Programming

- Program using the Lutron Designer software suite.

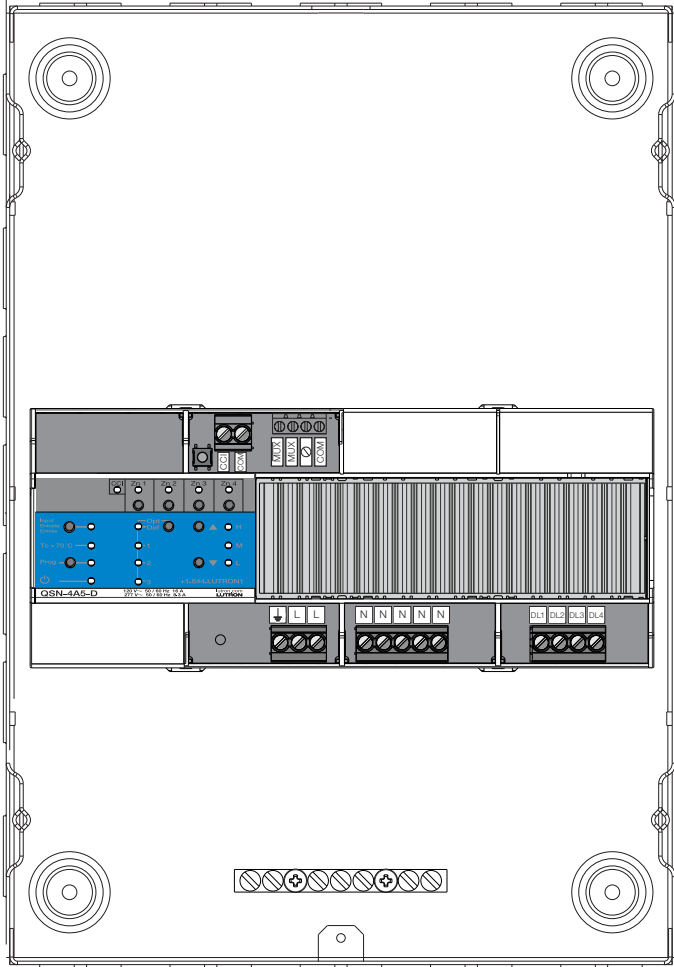
### Quantum System Programming

- Program using the Quantum Designer software suite.

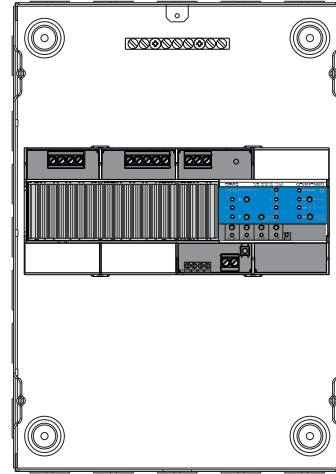
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### Mounting

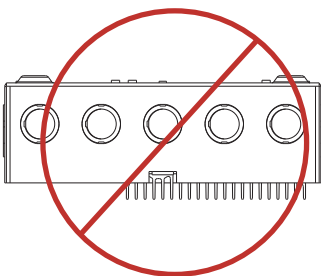
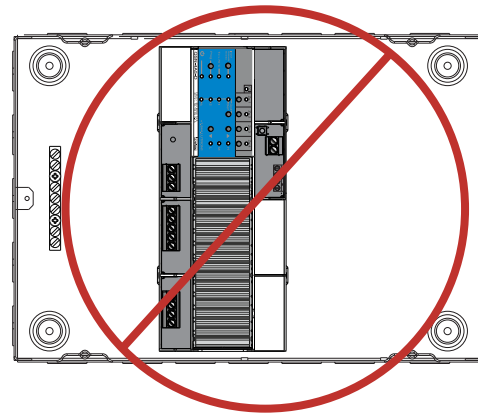
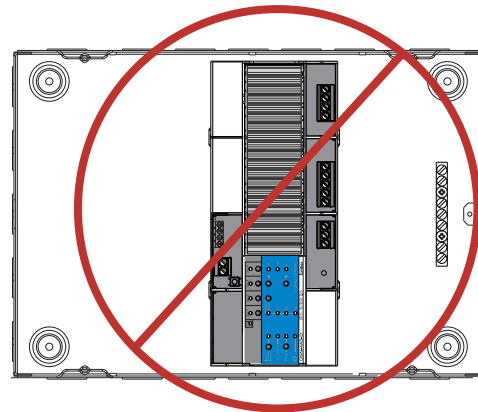
- For indoor use only
- Surface-mount
- Mount the ESN unit in a position where it can be easily located and accessed if service or troubleshooting is necessary.
- Mount vertically to ensure adequate cooling. Use 4 screws in corners of panel to securely mount the unit.
- Internal relays make audible noise, mount where acceptable.
- Unit generates heat, maximum 75 BTUs / hour.



Recommended orientation



Alternate orientation option

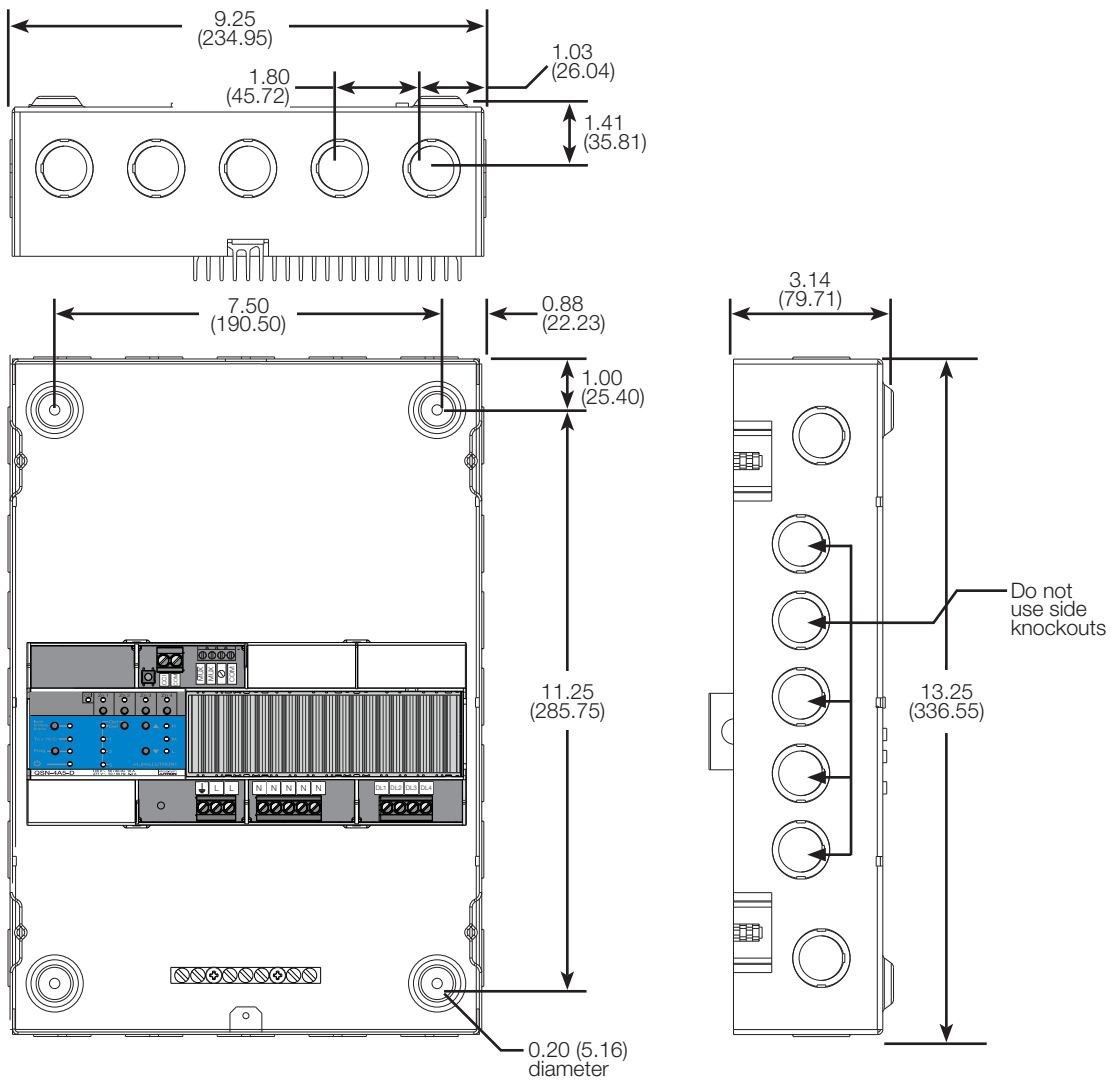


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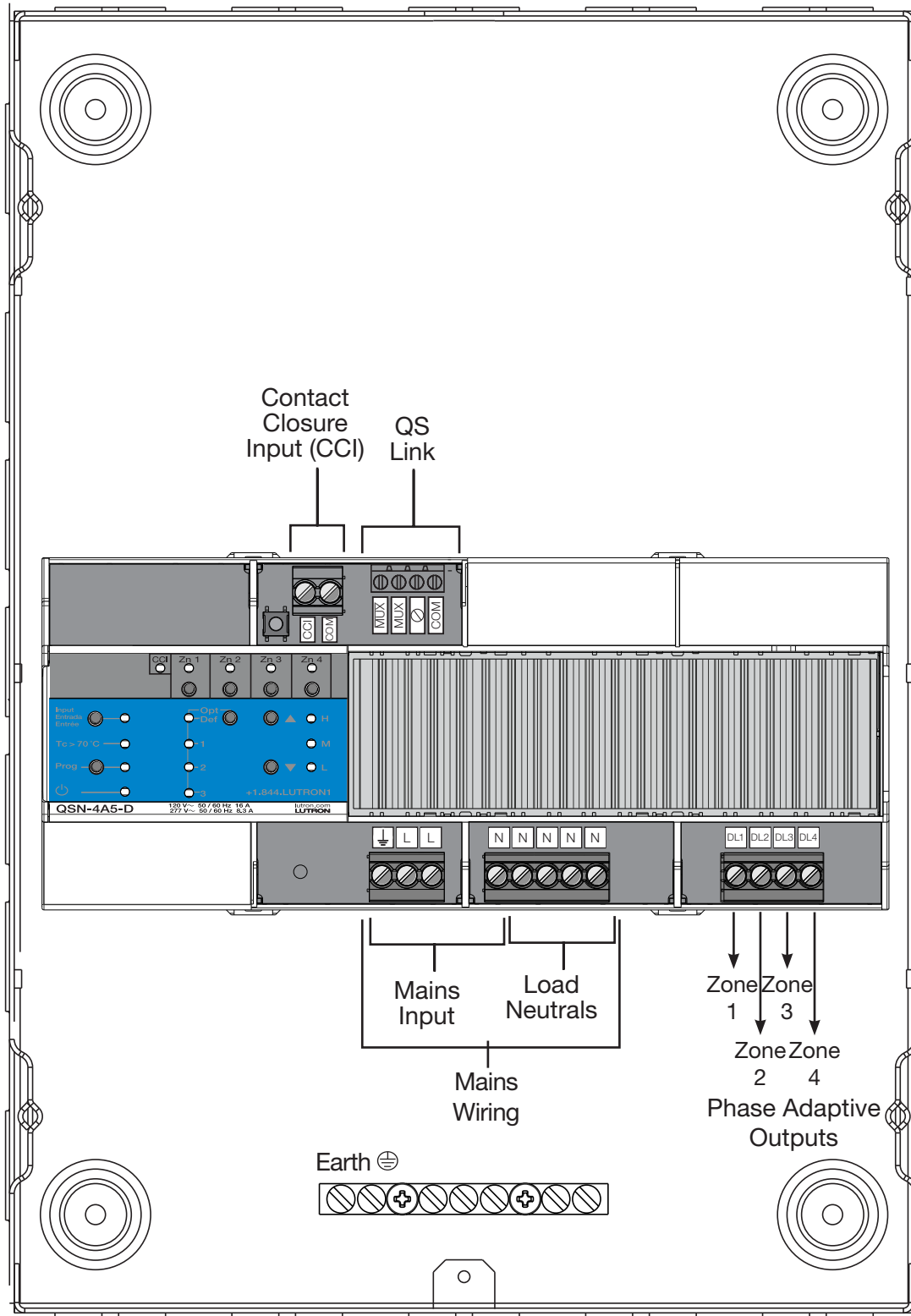
# Mechanical Dimensions

All dimensions shown as in (mm)



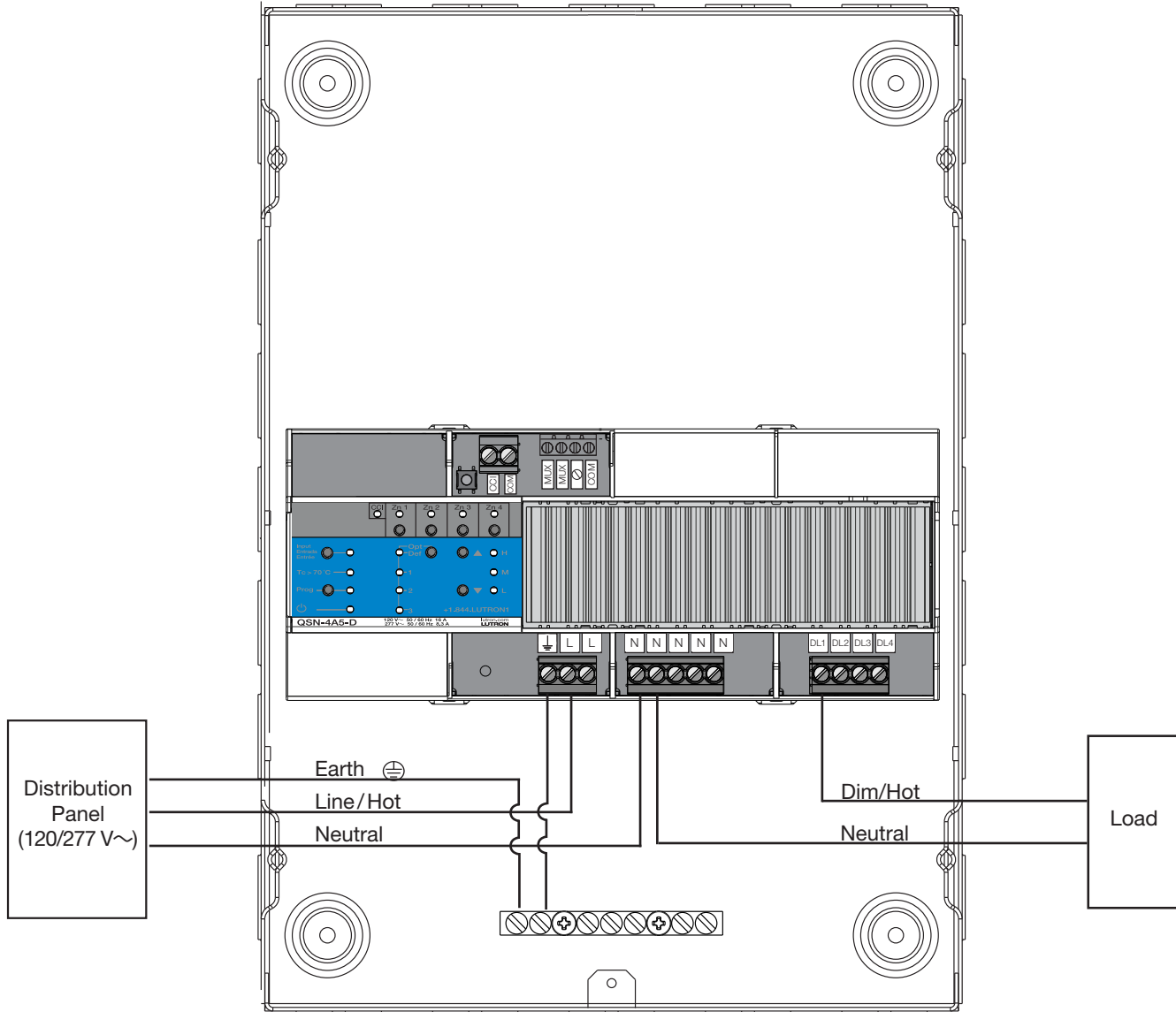
<b>Job Name:</b>	<b>Model Numbers:</b>
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# Overview of Wiring Terminals



Job Name:	Model Numbers:
Job Number:	

## Line Voltage Wiring



### Wiring from Distribution to the Fixture Controller

- Turn off all circuit breakers or isolators feeding the fixture controller at the distribution panel.
- Run line/hot, neutral, and earth (⊕) wires from the feed to the fixture controller.
- Run a separate neutral for each load circuit.

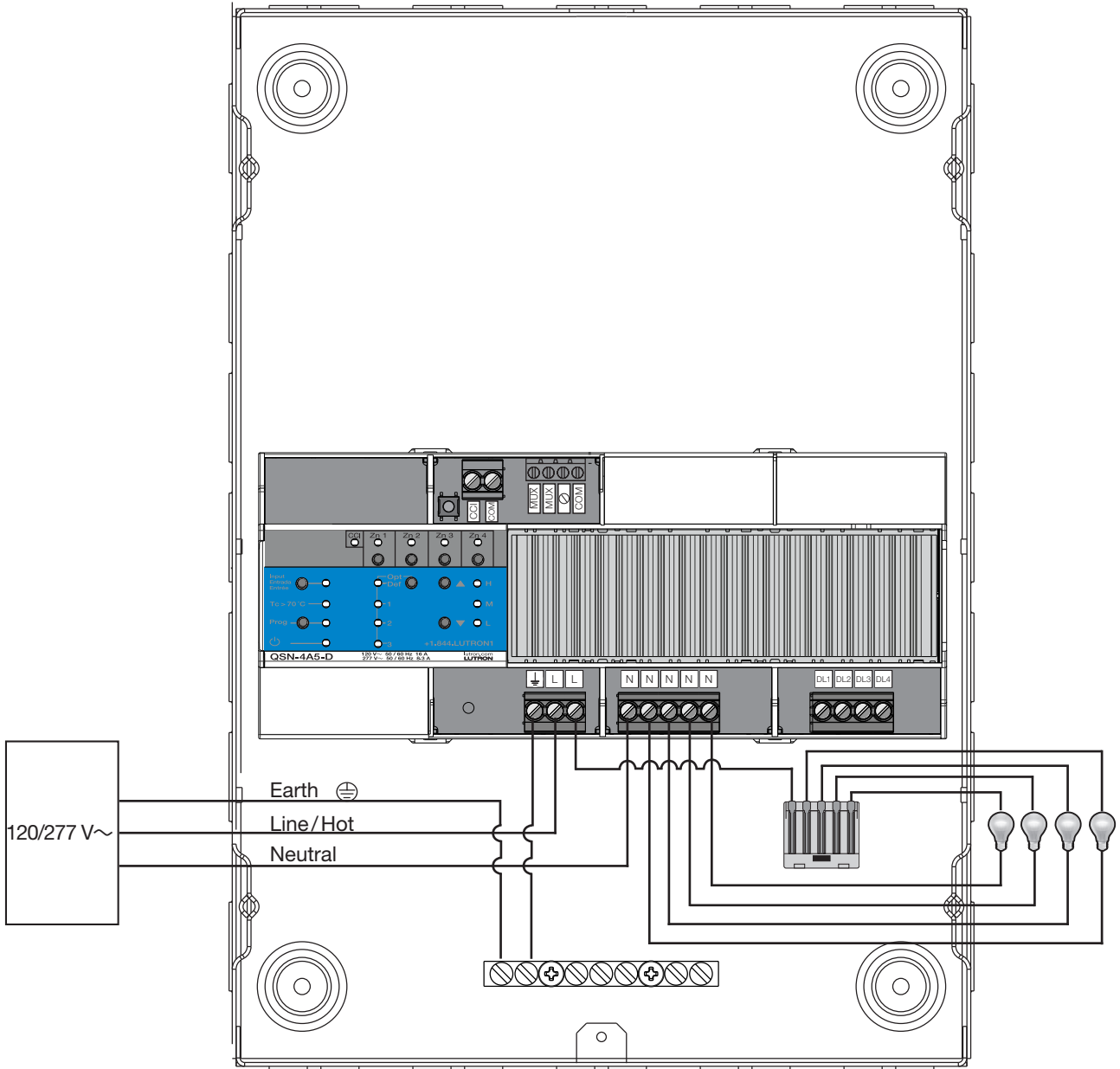
### Mains Wiring and NEC® Class 2 Separation

- Follow appropriate local and national codes to ensure proper separation.

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Job Number:	

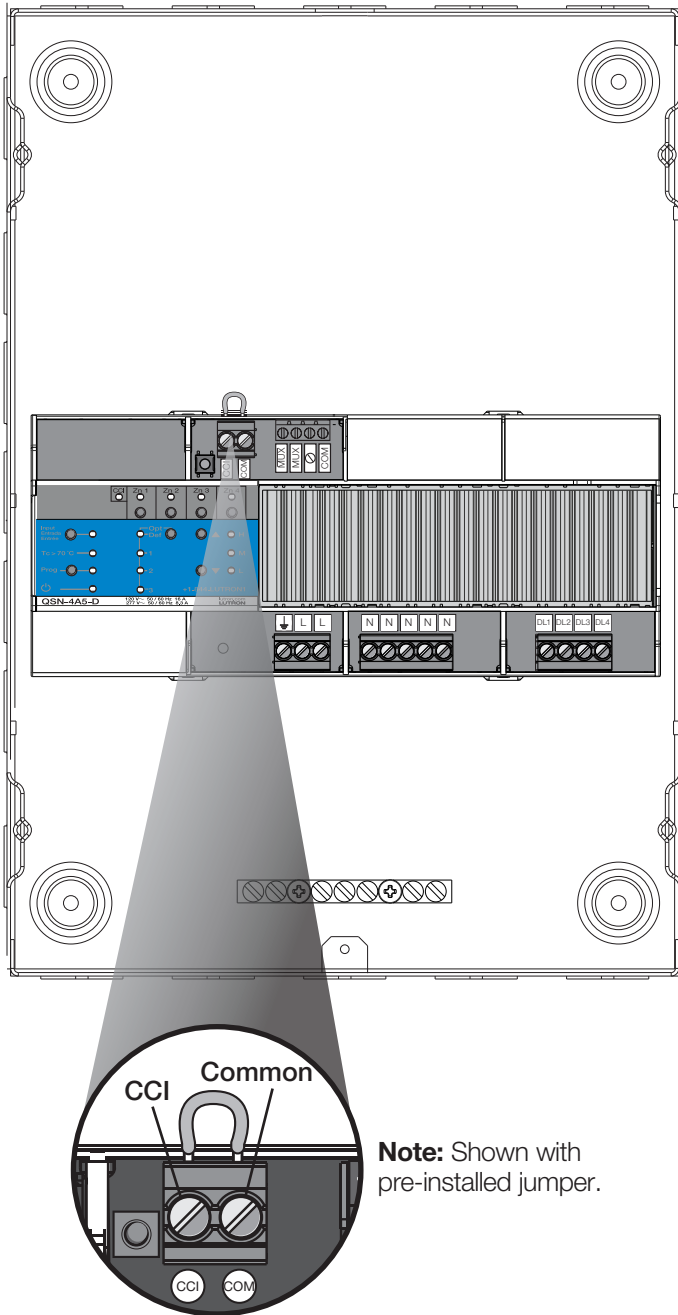
### Verify Wiring

- Apply power to loads to identify any load or wiring faults prior to connecting loads to unit.
- To verify wiring:
  1. Turn off power.
  2. Connect loads directly to Line/Hot to bypass the unit and protect it from wiring faults.
  3. Apply power, ensure the desired loads are powered and properly wired.
  4. Turn off power and connect loads to DL terminals on unit for normal operation.



Job Name:	Model Numbers:
Job Number:	

## Wiring: Contact Closure Input



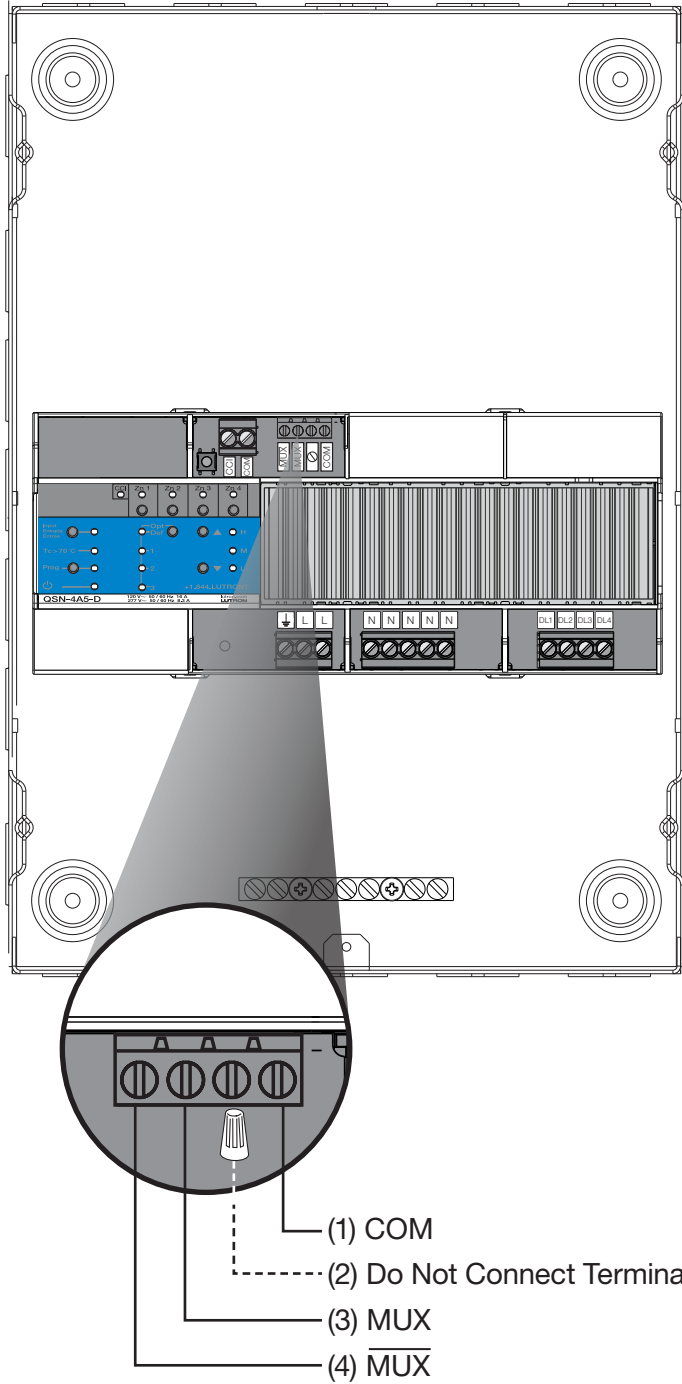
### NEC® Class 2 Contact Closure Input

- Contact Closure Input (CCI) wiring is NEC® Class 2. Follow all applicable national and local codes for proper circuit separation and protection.
- Turn off all breakers or isolators feeding the unit at distribution panel before servicing unit.
- The CCI is a local control only and cannot control other units over the QS link. A maximum of 32 units may be connected in parallel to a CCO device if the event is intended to affect multiple devices.
- When in emergency mode, all zone outputs will be at their programmed emergency light level (configurable for each zone, default is 100%). All sensors and controls are locked out.
- Contact closure input is normally closed (NC). The unit is shipped with a jumper pre-installed.

**Note:** The unit will default to emergency mode if the CCI is left open. If no emergency Contact Closure Input is required, leave the wire jumper in the CCI terminals.

Job Name:	Model Numbers:
Job Number:	

### Wiring: QS Link



#### QS Link NEC® Class 2 Wiring

- Follow all applicable national and local codes for proper circuit separation and protection.
- Link communicates using NEC® Class 2 wiring.
- Wiring may be daisy chained or T-tapped.
- Do NOT connect terminal 2.

#### QS Link Wiring Options

Control Link Length	Wire Gauge (for terminals)	Available from Lutron in one cable:
Less than 500 ft (153 m)	Power (terminals 1 and 2): 1 pair 18 AWG (1.0 mm <sup>2</sup> )	GRX-CBL-346S
	Data (terminals 3 and 4): 1 pair 22 AWG (0.5 mm <sup>2</sup> ), twisted and shielded*	
500 ft (153 m) to 2000 ft (610 m)	Power (terminals 1 and 2): 1 pair 12 AWG (4.0 mm <sup>2</sup> )	GRX-CBL-46L
	Data (terminals 3 and 4): 1 pair 22 AWG (0.5 mm <sup>2</sup> ), twisted and shielded*	

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