LUTRON QSN2 Energi Savr Node for 0–10 V- Energi Savr Node with Softswitch User Guide

Contents

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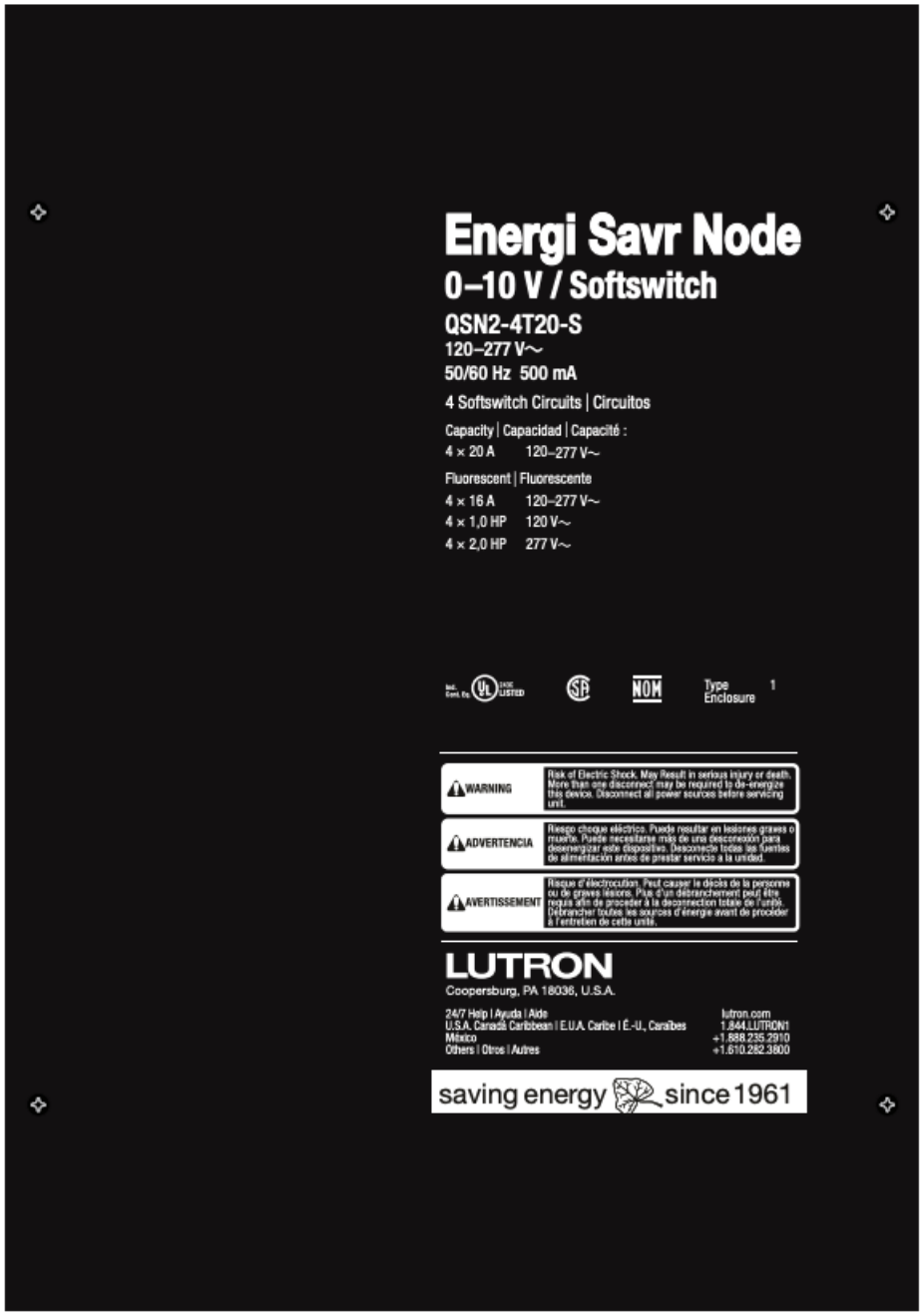


Energi Savr Node for 0–10 V⎓

Energi Savr Node with Softswitch

The Energi Savr Node (ESN) family is a group of modular products for the control of lighting, receptacles, and other loads. This document describes the following products:

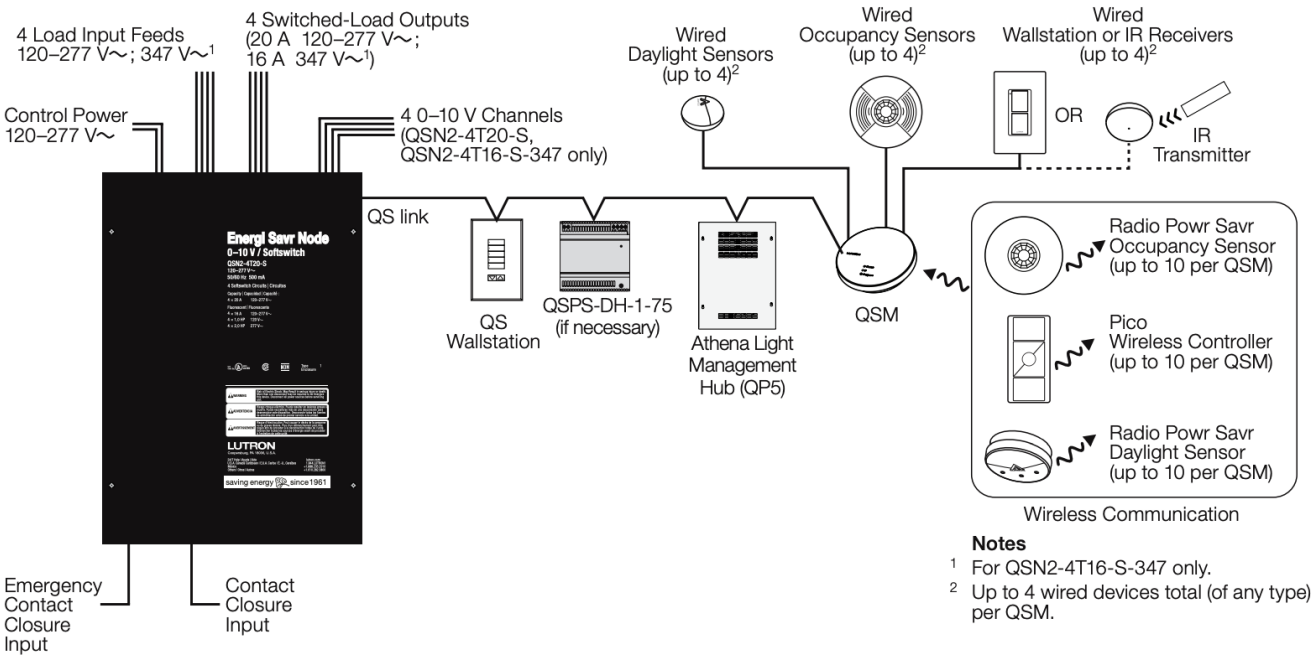
- Energi Savr Node for 0–10 V-/Softswitch (models QSN2-4T20-S, QSN2-4T16-S-347)
- Energi Savr Node with Softswitch (model QSN2-4S20-S)

Features

- Rated to switch 20 A receptacles with any output.
- Compatible with Lutron Athena system.
- Includes QS control link for seamless integration of loads, control stations, and QS sensor modules.

- Patented Softswitch circuit eliminates arcing at mechanical contacts when loads are switched, prolonging relay life to an average of 1,000,000 cycles at 16 A.
- BAA-compliant model numbers available, refer to Lutron BAA product list at www.lutron.com/baa
- 0–10 V⎓ fixtures used with this ESN must support switching power to turn on/off.

System Example



Specifications

Regulatory Approvals

- UL® Listed
- CSA
- NOM
- Lutron Quality Systems registered to ISO 9001:2015
- Complies with requirements for use in other spaces used for environmental air (plenums) per NEC® 2017 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
- For commercial use, FCC Part 15 Class A only

Power

- Control Power: 120 – 277 V~ 50/60 Hz
- Lightning strike protection meets ANSI/IEEE standard 62.41-1991. Can withstand voltage surges of up to 6000 V~ and current surges of up to 3000 A
- Current draw: 0.5 A max
- 10-year power failure memory: restores lighting to levels prior to power interruption
- Latching relays keep previously illuminated zones on when control power feed is lost

Environment

- Ambient Temperature Operating Range: 32 ºF to 104 ºF (0 ºC to 40 ºC)
- Relative humidity: less than 90% non-condensing
- For indoor use only
- Thermal dissipation: 40 BTU/hr

Terminal Wiring

- Control Power Wiring:
  14 AWG to 12 AWG (2.5 mm^2 to 4.0 mm^2)
  7 in-lbs (0.8 N•m)
- Load Wiring:
  14 AWG to 12 AWG (2.5 mm^2 to 4.0 mm^2)
  7 in-lbs (0.8 N•m)
- 0–10 V Wiring:
  20 AWG to 12 AWG (0.5 mm^2 to 4.0 mm^2)
  5 in-lbs (0.6 N•m)
- Contact Closure Wiring:
  20 AWG to 12 AWG (0.5 mm^2 to 4.0 mm^2)
  5 in-lbs (0.6 N•m)
- QS Link Wiring:
  5 in-lbs (0.6 N•m)
  Power (terminal 1):
  22 AWG to 12 AWG (0.25 mm^2 to 2.5 mm^2)
  (single wire, solid or stranded) **OR**
  22 AWG to 18 AWG (0.25 mm^2 to 1 mm^2)
  (two wires, solid or stranded)
  Data (terminals 3 and 4):
  1 pair, twisted and screened,
  22 AWG to 12 AWG (0.25 mm^2 to 2.5 mm^2) **OR**
  (single wire, solid or stranded)
  22 AWG to 18 AWG (0.25 mm^2 to 1 mm^2)
  (two wires, solid or stranded)

Physical Design and Mounting

- NEMA Type 1, IP-20 protection
- Surface-mount

Load Types (relay ratings)

- Rated to control 120-277 V~ 20 A receptacles with any output.
- When using the Energi Savr Node to control receptacles, it may be used with, but is not limited to, the following:

– Monitors

– Fans

– Humidifiers

– Printers

Note: Refer to the manufacturer's guidelines for acceptable switching methods.

- When using the Energi Savr Node to control receptacles, it may NOT be suitable for use with devices that require any of the following:

  – Shut-down process before power is interrupted, such as computers.

  – Cool-down process before power is interrupted, such as projectors.

  – Programming, such as clocks or DVRs.

  – Long warm-up cycle.
- **Not for use** with loads that present a hazard if automatically energized (e.g., heaters).
- Any receptacles that are controlled by an automatic control device **must be marked** with " ⏻ Controlled" located on the controlled receptacle outlet where visible after installation as stated in 2017 NEC® Article 406.3(E).

	Relay Ratings	
Load Type	**120–277 V~** QSN2-4S20-S QSN2-4T20-S QSN2-4T16-S-347	**347 V~** QSN2-4T16-S-347
Tungsten	20 A	16 A
AC general use	20 A	16 A
Electric discharge lamp	16 A	16 A
LED drivers and fluorescent ballasts (NEMA 410)	16 A	16 A
Resistive	20 A	16 A
Inductive	20 A	16 A
Motor	1.0 HP 120 V~ 2.0 HP 277 V~	—

Softswitch 120–277 V~; 347 V~

- For Softswitch relay ratings see the Relay Ratings chart under Load Types section.
- Relay is mechanically held.

0–10 V⎓ Output Ratings (QSN2-4T20-S, QSN2-4T16-S-347)

- Each output sinks up to 50 mA maximum.
- Each output sinks current only (load device must provide 10 V ⎓ supply).
- Provides an IEC PELV/NEC® Class 2 isolated 0–10 V output signal that conforms to IEC 60929.
- 0–10 V⎓ fixtures must support switching power to turn on/off. Use switched outputs to switch fixtures according to wiring diagrams shown on pages 9-11
- Minimum voltage (Off, when relay is open) at the 0–10 V ⎓ terminals of the ESN module is 1.0 V when 0–10 V

⎓ wires are loaded to 50 mA. Voltage at the fixture will vary; refer to “How far can I run a low voltage 0–10 V ⎓ circuit” of App Note #587 (P/N 048597) at www.lutron.com to determine required wire gauges, lengths, and compatibility.

Contact Closure Input (CCI)

- Activate scenes using momentary or maintained closures from an external device such as a timeclock.
- The attached device must provide a dry-contact closure or solid-state output.
- Configurable for normally-open (NO) or normally-closed (NC) operation.
- Input is miswire-protected up to 36 V⎓.

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.
- Attached devices, by default, will go to maximum output and ignore control inputs.
- No operations will be allowed until emergency signal is cleared.
- The attached device must provide a dry-contact closure or solid-state output.
- Input is miswire-protected up to 36 V⎓.
- Emergency CCI cannot control other ESN units.

QS Link Limits

- ESN unit does not provide PDUs
- Each ESN unit counts as 1 device towards the QS device limit.
- Each ESN unit counts as 4 zones towards the zone limit.

Programming and Compatibility Requirements

- Setup and programming of the switching power module is done through the Athena programming software.
- Athena software version 20.4 or higher is required.

Out of Box Functionality

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

Emergency Contact Closure Input (CCI)

- **Normal mode:** The unit can dim loads as normal and respond to button presses, occupancy sensors, daylight sensors, timeclock events and preset scene calls.
- **Emergency mode:** When the Emergency CCI is open, the unit will override the light output to its emergency level and enter lockout mode. It will not respond to any button presses, occupancy sensors, daylight sensors, timeclock events, or preset scene calls.

- **Return from Emergency mode to Normal mode:** Once the Emergency CCI is closed or jumpered, the zones will return to the previous light level and it will again respond to button presses, occupancy sensors, daylight sensors, timeclock events, and preset scene calls.
  Note: Unit will process any sensor events received while in emergency mode after it exits emergency mode.

Contact Closure Input (CCI)

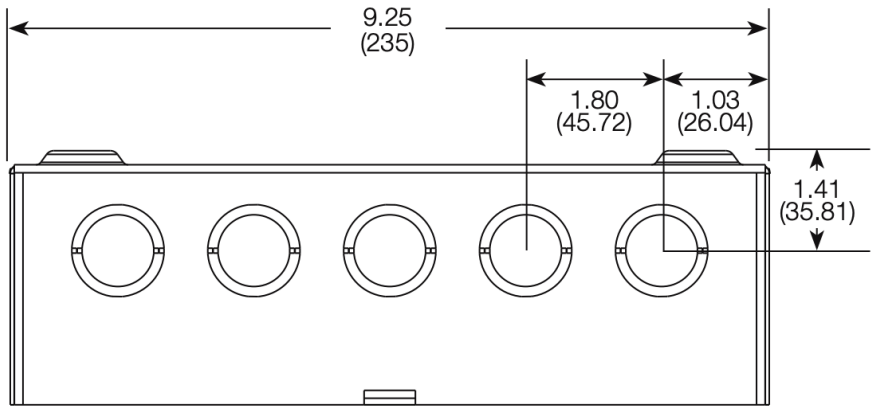
- Momentary closure from a normally-open (NO) dry-contact closure device will result in all zones being turned off.

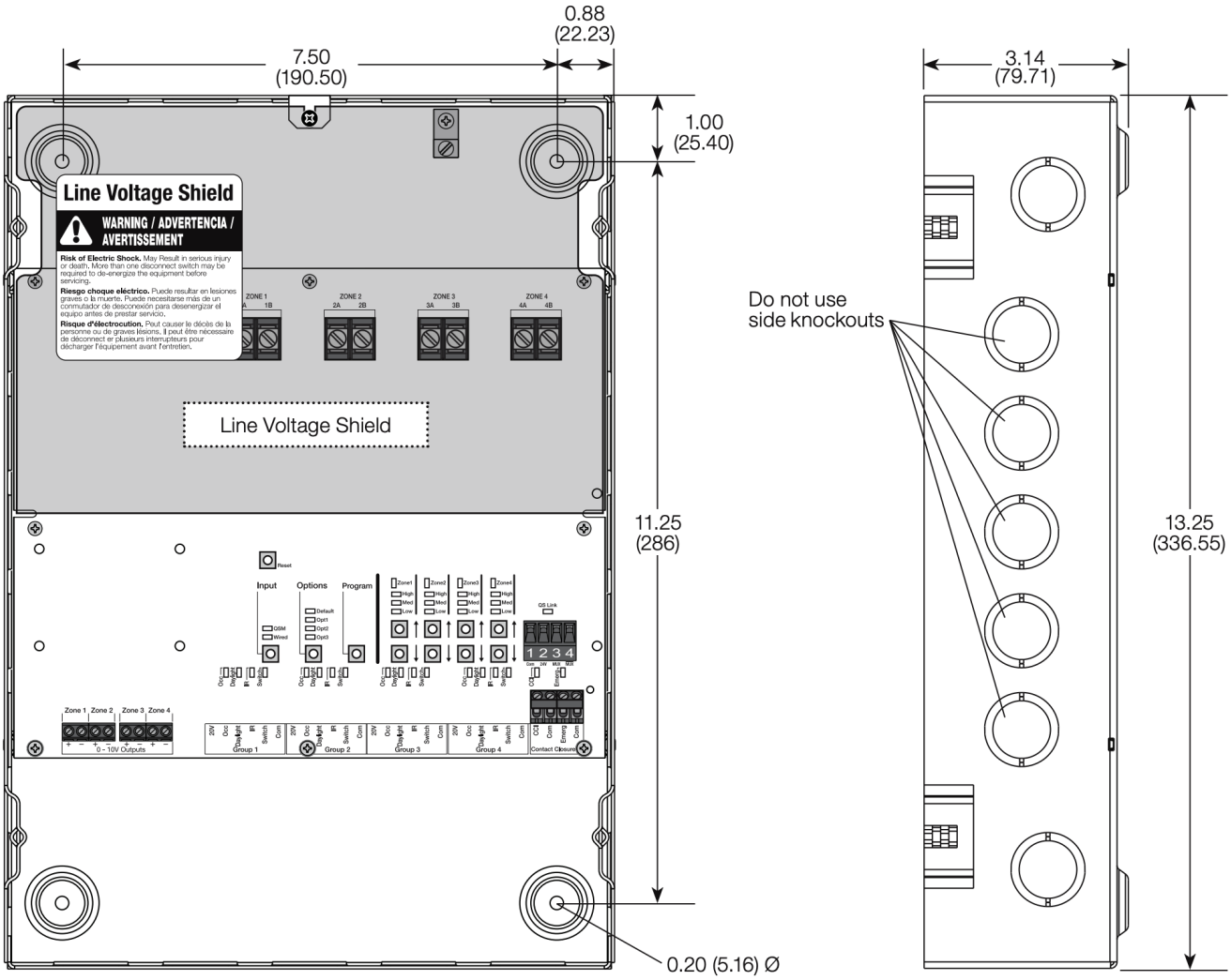
Normal Mode Operation

- In normal operation, the following buttons allow the user to access certain basic functions:
  - Raise
    - 0-10 V /Softswitch: Raises zone light level in 1% increments from 0-100%.
    - Softswitch: Turns selected zone on.
  - Lower
    - o 0-10 V /Softswitch: Decreases zone light level in 1% decrements from 100-0%.
    - Softswitch: Turns selected zone off.
      Note: On 0-10 V /Softswitch only — For any zone, simultaneously pressing and holding the Raise and Lower buttons will toggle the zone between high-end and low-end.

Mechanical Dimensions

All dimensions shown as in (mm)





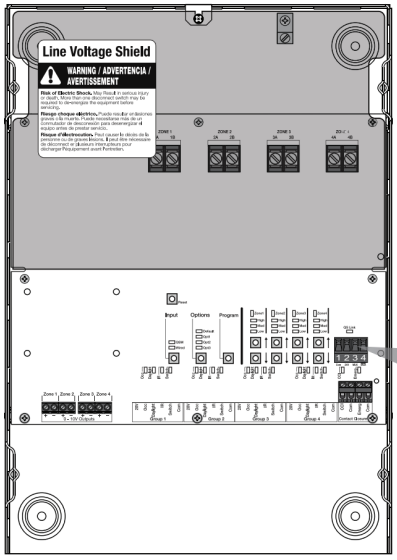
Wiring: QS Link

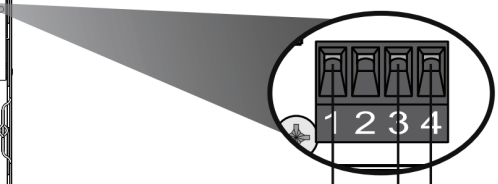
- QS link communication uses IEC PELV/NEC® Class 2 wiring. Follow all local and national electrical codes when installing IEC PELV/NEC® Class 2 wiring with line voltage wiring.
- The total distance of the QS link wiring must not exceed 2000 ft (610 m).

QS Link Wiring Distance	Wire Gauge	Available from Lutron in one cable:
Less than 500 ft (152.4 m)	*Power (terminals 1 and 2):* 1 pair 18 AWG (1.0 mm^2)	GRX-CBL-346S (non-plenum) GRX-PCBL-346S (plenum)
	Data (terminals 3 and 4): 1 pair 22 AWG (0.5 mm^2), twisted and screened*	
500 ft (152.4 m) to 2000 ft (610 m)	*Power (terminals 1 and 2):* 1 pair 12 AWG (4.0 mm^2)	GRX-CBL-46L (non-plenum) GRX-PCBL-46L (plenum)
	Data (terminals 3 and 4): 1 pair 22 AWG (0.5 mm^2), twisted and screened*	

* Alternate data-only cable: Use approved data loop cable (22 AWG [0.5 mm^2] twisted/screened) from Belden, model #9461.

Energi Savr Node unit
with EcoSystem

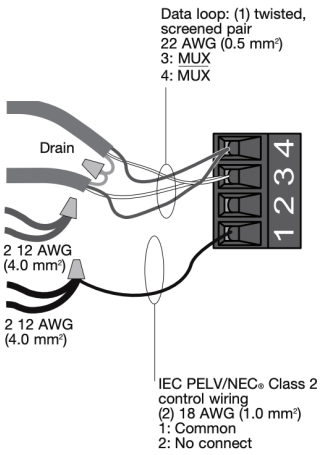




(4) $\overline{\text{MUX}}$
(3) MUX
(2) 24 V⎓
(1) COM

Wiring for QS link for 500 ft (152.4 m) to 2000 ft (610 m).

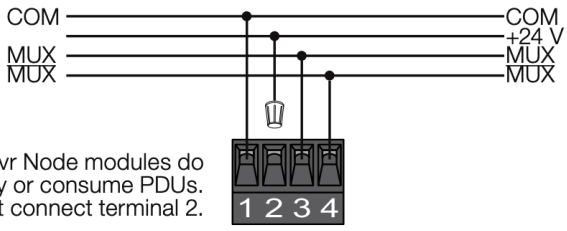
Terminal block will not accept 12 AWG (4.0 mm^2) directly.



Control Link Wiring

Note: These Energi Savr Node modules do not supply or consume PDUs. Do not connect terminal 2.

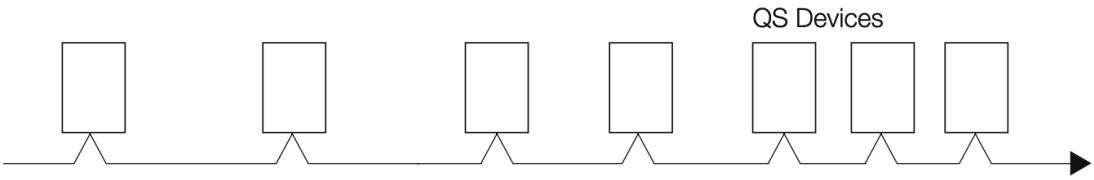
Only terminals 1, 3, and 4 connected between devices that supply PDUs



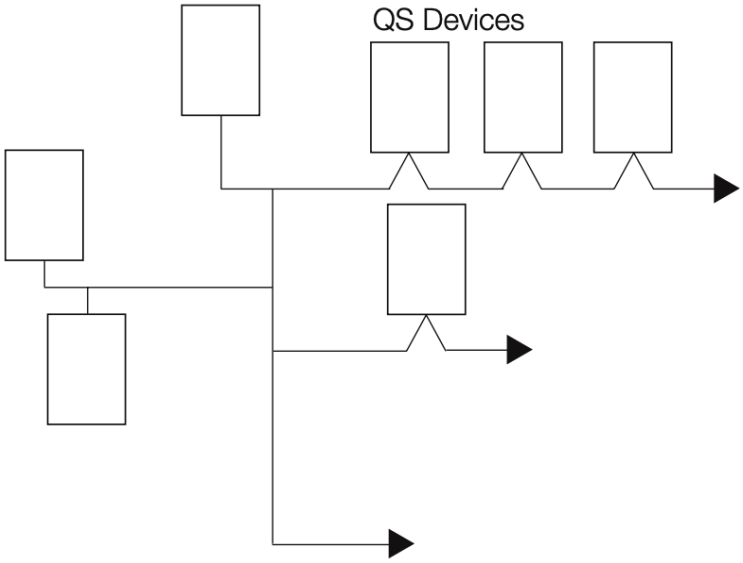
All 4 terminals connected to QS link devices that consume PDUs

These Energi Savr Node modules do not supply or consume PDUs. Do not connect terminal 2.

Daisy-Chain Wiring Example



T-Tap Wiring Example



QS Link Wiring Rules

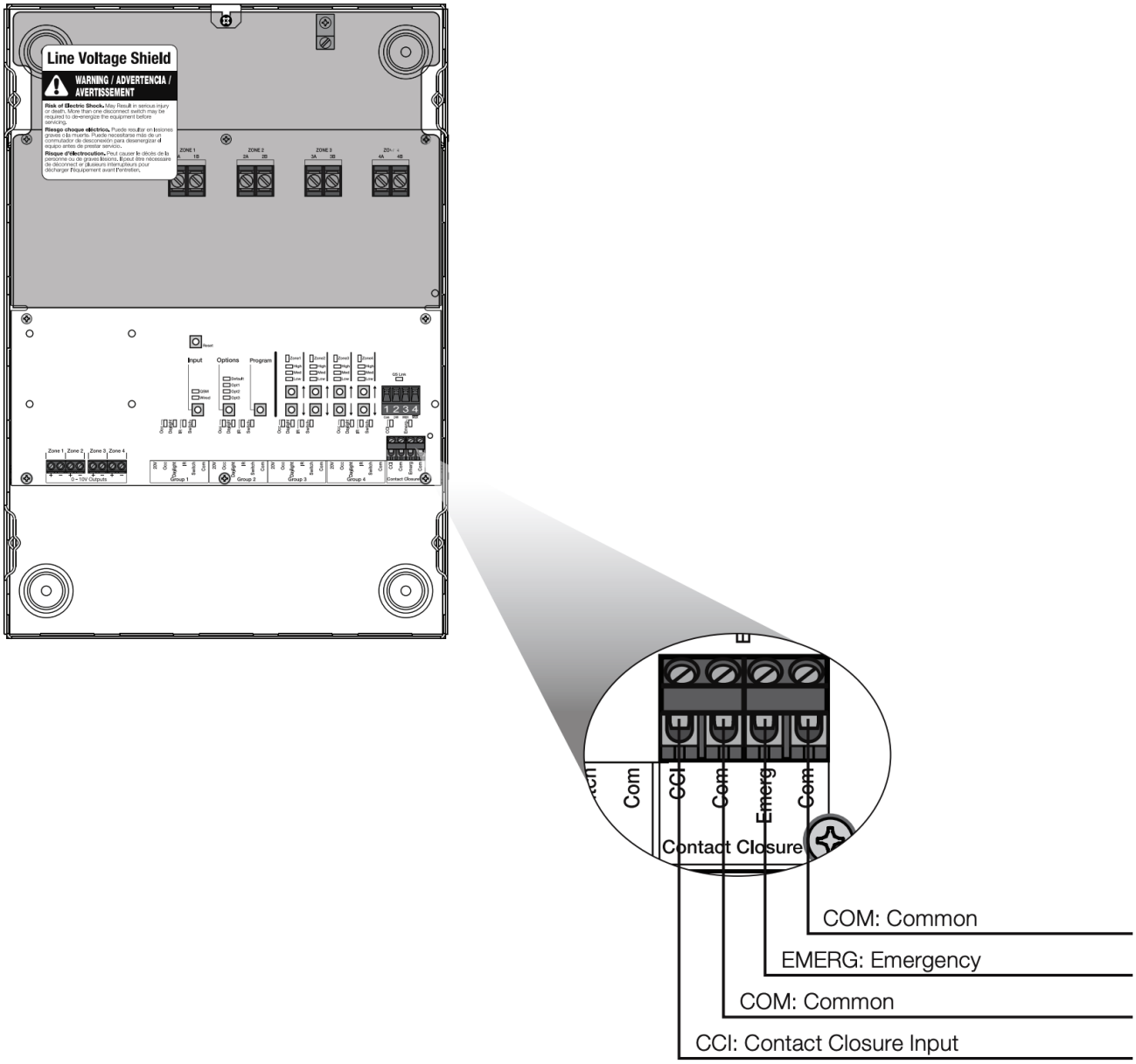
Terminal 2 (+24 V) should NEVER be connected between devices that supply PDUs.

For QS Link power supply wiring connection details, refer to the installation instructions for the specific power supply model being used.

Wiring: Contact Closure Inputs (CCI and Emerg)

Contact Closure Wiring

- Single-wire 20 to 12 AWG (0.5 to 4.0 mm^2)
- Strip length: 1/4 in (6 mm)
- Torque: 5 in-lb (0.6 N•m)



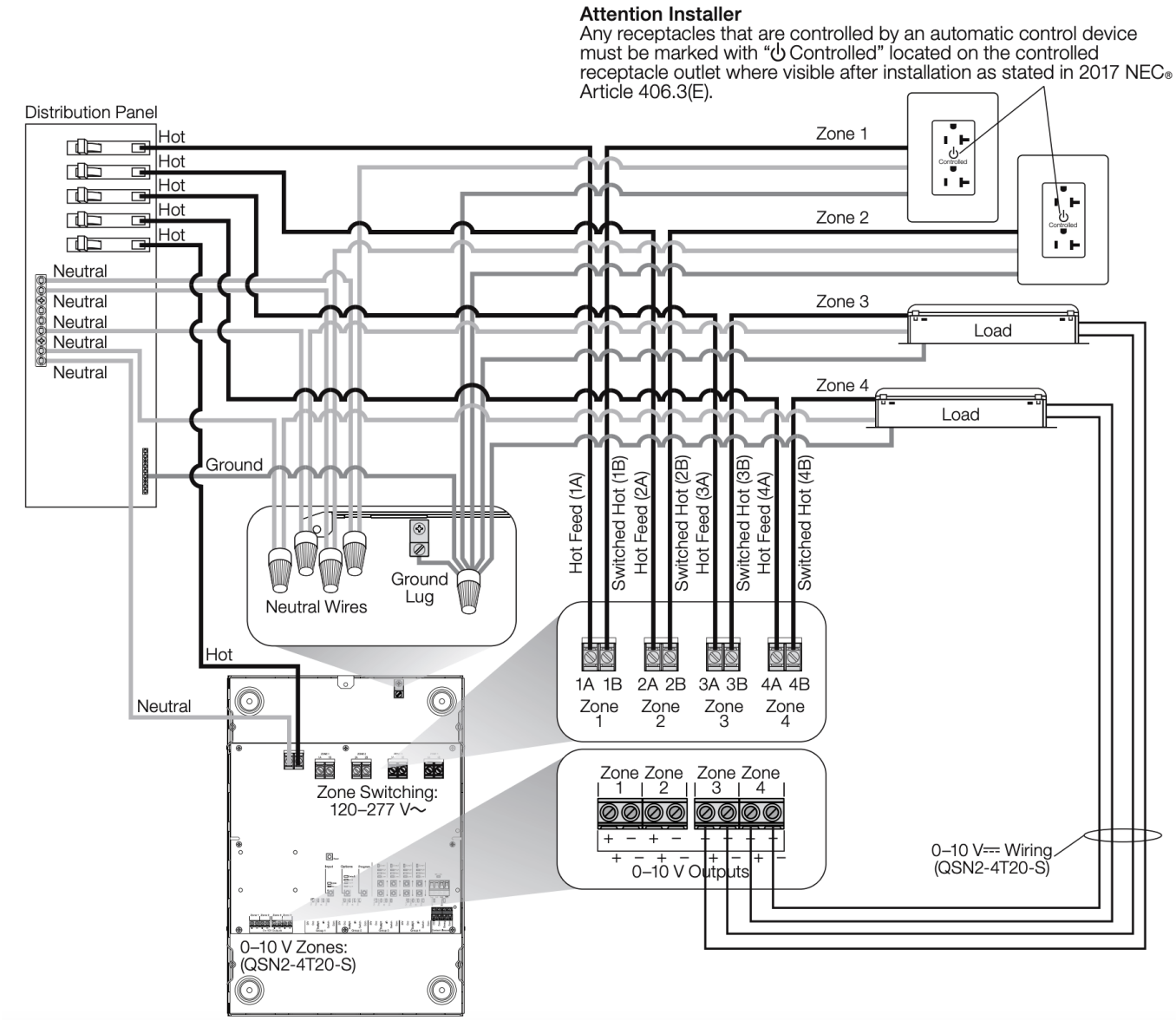
Wiring: 4 Circuits, Multiple Feeds

Load Wiring

- Two (2) 14 to 12 AWG (2.5 to 4.0 mm^2)
- Strip length: 3/8 in (8.5 mm)
- Torque: 7 in-lb (0.8 N•m)

Attention Installer

Any receptacles that are controlled by an automatic control device must be marked with “ ⏻ Controlled” located on the controlled receptacle outlet where visible after installation as stated in 2017 NEC® Article 406.3(E).



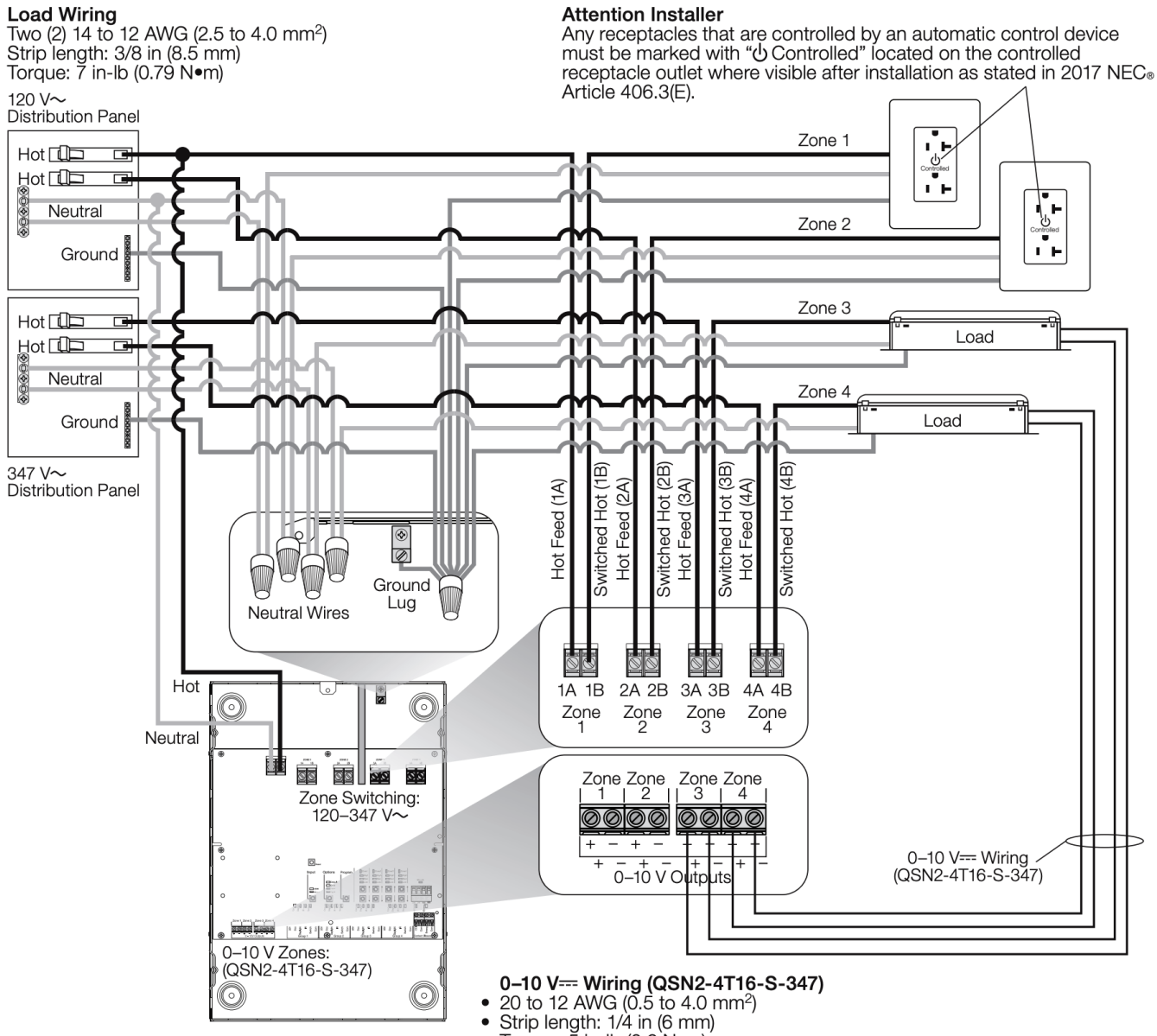
0–10 V⎓ Wiring (QSN2-4T20-S)

- 20 to 12 AWG (0.5 to 4.0 mm^2)
- Strip length: 1/4 in (6 mm)
- Torque: 5 in-lb (0.6 N•m)
- 0-10 V⎓ control wires for zones 1-4 can be installed using NECR Class 1 or Class 2 wiring methods.
- 0–10 V zones 1–4 are not isolated from each other.
- Negative (–) terminals are not internally connected to each other; both positive (+) and negative (–) connections must be made.
- Follow all national and local codes for separation requirements.
- If any pair of 0-10 V⎓ control wires are installed using NECR Class 1 wiring methods, then these wires must be physically separated from all other Class 2 wiring in the Energi Savr Node in accordance with NECR guidance on separation of Class 1 and 2 wires.
- If one pair of 0-10 V⎓ control wires are wired using NECR Class 1 wiring methods, then all pairs of 0-10 V- control wires must be installed using NECR Class 1 wiring methods.

Warning **WARNING: Entrapment/Fire Hazard.** To avoid the risk of entrapment, serious injury, or death, these controls must not be used to control equipment which is not visible from every control location or

which could create hazardous situations such as entrapment if operated accidentally. Examples of such equipment which must not be operated by these controls include (but are not limited to) motorized gates, industrial doors, space heaters, etc. It is the installer's responsibility to ensure that the equipment being controlled is visible from every control location and that only suitable equipment is connected to these controls. Failure to do so could result in serious injury or death.

Wiring: 4 Circuits, Multiple Feeds, 120 V~ Receptacles and 347 V~ Lighting



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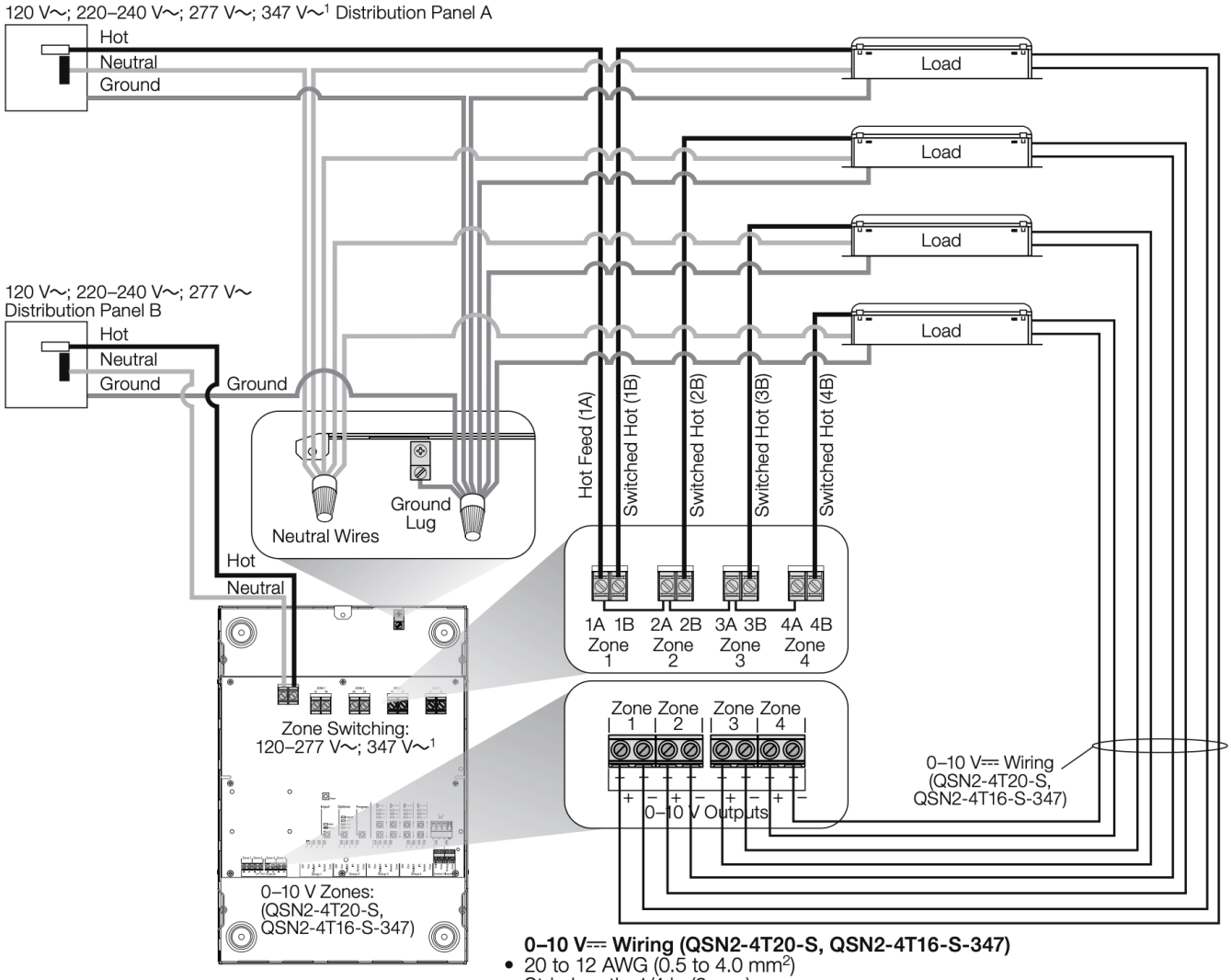
Wiring: 4 Circuits, Single Feed

Load Wiring

- Two (2) 14 to 12 AWG (2.5 to 4.0 mm²)
- Strip length: 3/8 in (8.5 mm)
- Torque: 7 in-lb (0.8 N•m)



[1] 347 V~ switching applies only to QSN2-4T16-S-347.

0–10 V⎓ Wiring (QSN2-4T20-S, QSN2-4T16-S-347)

- 20 to 12 AWG (0.5 to 4.0 mm²)
- Strip length: 1/4 in (6 mm)
- Torque: 5 in-lb (0.6 N•m)
- Connect only IEC PELV/NEC® Class 2 circuits or connect only non-IEC PELV/NEC® Class 2 circuits to 0–10 V⎓ zones 1–4.
- 0–10 V⎓ zones 1–4 are not isolated from each other.
- Negative (–) terminals are not internally connected to each other; both positive (+) and negative (–) connections must be made.
- Follow all national and local codes for separation requirements.

Warning **WARNING: Entrapment/Fire Hazard.** To avoid the risk of entrapment, serious injury, or death, these controls must not be used to control equipment which is not visible from every control location or which could create hazardous situations such as entrapment if operated accidentally. Examples of such equipment which must not be operated by these controls include (but are not limited to) motorized gates, industrial doors, space heaters, etc. It is the installer's responsibility to ensure that the equipment being controlled is visible from every control location and that only suitable equipment is connected to these controls. Failure to do so could result in serious injury or death.

Documents / Resources

	LUTRON QSN2 Energi Savr Node for 0–10 V- Energi Savr Node with Softswitch [pdf] User Guide Energi Savr Node for 0 10 V- Energi Savr Node with Softswitch, Energi Savr Node, QSN2 Energi Savr Node for 0 10 V- Energi Savr Node with Softswitch

References

- Lutron: Beautiful light. Intelligent Shades. Powerful Controls
- Lutron: Beautiful light. Intelligent Shades. Powerful Controls
- Buy American Act Compliant Light Control Solutions