# Emergency Lighting

## Overview

Emergency lighting is an important aspect of designing a lighting system for commercial spaces. The system requirements are defined by several codes and standards. These requirements can be fulfilled by using a variety of equipment and methods.

The purpose of this application note is to give the reader an understanding of codes and standards, basic emergency system components and how those components work together with Lutron products to fulfill emergency lighting requirements; it is not intended to provide a design guide for emergency systems. This guide focuses on installations in the United States. Consult local and national codes for emergency lighting requirements in other countries.

For Vive systems, refer to Application Note #628 (P/N 048628) at www.lutron.com

For KetraNet systems, refer to Application Note #730 (P/N 048730) at www.lutron.com

**NOTE:** The backup AC power source for Lutron dimmers and controls must produce a sinusoidal (sine) wave.

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## Codes and Standards

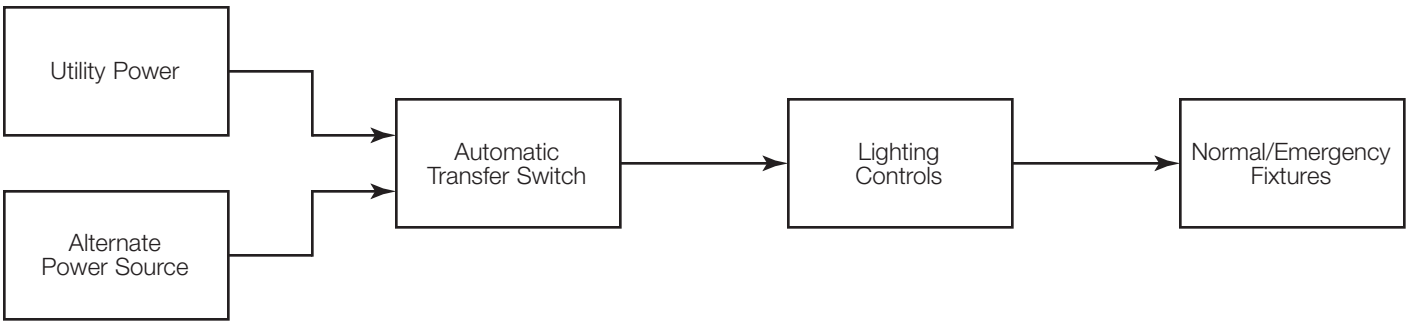
The following is a brief overview of some of the codes and standards that are frequently encountered when discussing emergency lighting requirements:

- **NFPA 70®** is the National Electrical Code® or NEC®. Several articles in this code are dedicated to the requirements for emergency lighting and power systems and equipment. As defined by NFPA 70® Article 700, emergency systems are those that are *intended to supply, distribute, and control the power and illumination essential for safety to human life*. All emergency lighting and circuits must be separated physically and electrically from normal/non-emergency power devices.
- **NFPA 101®** is the Life Safety Code®. This code defines requirements for paths of egress as well as minimum illumination levels that the emergency lighting system must provide. These requirements include:
  - The minimum illumination level along any path of egress shall be 1 fc (10.76 lx)
  - The transfer to emergency lighting must be automatic and occur within 10 seconds of a loss of power
  - Emergency lighting must operate for a minimum of 90 minutes following the failure of normal power
- **NFPA 99** is the Healthcare Facilities Code. This code has provisions similar to NFPA 70® and NFPA 101® and refers to those codes throughout. It also provides new provisions for three different emergency circuit types: A Life Safety Branch, which is similar to the provisions in NFPA 70®, a Critical Branch, which describes those circuits dedicated to patient-care rooms, and an Equipment Branch, which describes those circuits feeding 3-phase power equipment.
- **NFPA 110** is the Standard for Emergency and Standby Power Systems. It describes the requirements for the systems and equipment that are meant to provide the alternate source of electrical power in the event of a loss of normal power.
- **IBC®** is the International Building Code®. It contains requirements similar to NFPA 101®, including many of the same minimum illumination levels.
- **UL® 924** is the Standard for Emergency Lighting and Power Equipment. It is applicable to the equipment that bypasses any controls and automatically supplies illumination and/or power to critical areas when normal power fails. Examples include exit signs, emergency ballasts and LED drivers, automatic load-control relays, and the Lutron LUT-ELI.
- **UL® 1008** is the Standard for Transfer Switch Equipment. It is applicable to transfer switches that transfer power between the normal power supply and the emergency power supply, and back again. These devices may be on the supply side of a distribution panel, such as Automatic Transfer Switches (ATS) or on the load side, such as a Branch Circuit Emergency Lighting Transfer Switch (BCELTS). An example of a UL 1008 listed load-side transfer switch is the LUT-ATS-D.

  **Note:** Codes such as NFPA and IBC are building installation codes, describing design decisions and steps that must be taken to help ensure a safe building. UL standards are product-level standards, describing features and functions of individual products within a building that help ensure individual products operate safely. UL standards often will evaluate whether the product being investigated can be installed in accordance with building installation codes such as those published by the NFPA.

  Building inspectors are expecting the finished building to meet the requirements as specified in the NFPA code. These NFPA requirements rarely call out specific UL standards as a mandate. However, products that meet certain UL standards may be used to meet the requirements stated in the NFPA code. Because of this, certain products (or combinations of products) may be used to meet the intent of the NFPA requirements without meeting a specific UL standard, but should still be considered acceptable to a building inspector.

# Overview of Emergency Lighting Equipment




## Alternate Power Source

If utility power is lost, an alternate power source must be available to drive the lighting loads. The size of the load and the duration of the emergency condition will determine the capacity of this alternate source.

- **Generators:** Backup generators are a common source of emergency power. Sizes of generators can vary significantly; the quality of power delivered by the generator can also vary a great deal. Depending on the size of the generator and its load, the frequency of the AC power may vary during operation. Dimmers running on generators must be capable of handling varying frequencies and generators must be capable of powering dimmer loads.
- **Inverters:** Inverters take the DC voltage from batteries and convert it into AC power by *inverting* the DC at the frequency of the AC power line. Then, filters are used to smooth out the switched output. Stable operation of dimmers on this type of power source depends on the capability of the filter used and the control loop of the inverter. These inverters can range from being very large, building level, to single circuit devices. Only inverters that are designed to drive dimmer loads should be used.

**NOTE:** Total Harmonic Distortion (THD) is a measure of the distortion on the AC power waveform. It is important that the maximum THD of the power source selected is less than 10%. If the THD is larger than 10%, there may be instabilities in the lighting loads which will result in flicker.

## Capabilities and Recommendations

Lutron products are capable of operating when being powered by generators or inverters. Phase control dimmers can be difficult for inverters and generators to power. Be sure that the generator or inverter being used is capable of powering phase control dimmers. Because of this challenge Lutron recommends the following:

1. Emergency loads should be switched loads. This significantly reduces complexity, but is highly unlikely since dimmed loads are very prevalent in commercial buildings.
2. When dimmed loads are emergency loads, use alternate dimming methods besides phase control (EcoSystem, 0-10 V⎓ etc).
3. If phase control dimmers must be on emergency, special considerations are necessary. Lutron recommends:
   a. The dimmer should make the load go to high end upon emergency.
   b. Derating the rated load of the dimmer by 75% when these loads are on an inverter. This is because the source impedence is between 3X and 4X higher on an inverter than utility power. This can cause undesired dimmer interaction.
   c. Derating may be required when these loads are on a generator. Consult generator manufacturer for more information.

## Automatic Transfer Switch (ATS)

The Automatic Transfer Switch (ATS) is a key component in Emergency Lighting Systems. The role of the ATS is to connect loads to an acceptable power source, accomplished by continuously sensing the availability of normal power and automatically switching to an alternate power source if the normal power source is unavailable. In some cases, the ATS and alternate power source are contained in the same unit. This is most frequently found when inverters are used. ATS devices are required to meet UL® 1008 standards. Lutron does not manufacturer an ATS. However, Lutron lighting controls may be used in conjunction with an alternate power source and ATS devices from others. Lutron does not recommend any one manufacturer over another. The selection of equipment must be made by knowledgeable and trained personnel.

## Overview of Emergency Lighting Equipment (continued)

### Lighting Controls

Lutron offers many options for emergency lighting applications. Local codes determine the amount of emergency lighting required to meet minimum lighting levels during a loss of power. How these levels are achieved is dependent on the design of the system. The simple use of an alternate power source and an ATS can provide any lighting control with power during an emergency condition. However, that control must meet the following requirements:

- If the control is off, it must turn on automatically;
- The light level of the control must ensure that required footcandle levels are maintained during the emergency condition;
- The control of emergency lighting cannot be overridden except by authorized persons.

#### Achieving lighting control requirements

1. The first method is to use an Automatic Load Control Relay (ALCR) to drive a load to full power. In this case, the state of the lighting control is not critical because the load is driven to full power through the ALCR. Refer to the *Automatic Load Control Relays section,* beginning on page 9, for additional details.
2. The second method is to give the lighting control an input that forces the circuits designated as "Normal/Emergency" to turn on to their appropriate level and disable all local controls so that these levels cannot be changed by unauthorized personnel. Any lighting system that is designated for use as an emergency lighting system should meet the requirement defined by UL® 924. Ultimately, the Authority Having Jurisdiction (AHJ) will have the final decision in accepting the lighting system for its compliance with local codes. Refer to the specific *Lutron products* section later in this document for additional details.

### Normal/Emergency Fixtures

Normal/Emergency lighting fixtures may describe several different applications:

- Emergency-only fixtures are those that are not controlled by an actual lighting control system. Any of three strategies may be employed:
  - Provide dedicated circuits that are fed from a normal/emergency source and are on 24/7. This strategy is typically employed in corridors and stairwells
  - Power some fixtures by emergency power only. These fixtures are off when normal power is present and come on only when normal power is lost
  - Use fixtures that have self-contained batteries. These fixtures are connected to normal power which is used to charge the batteries. When normal power is present, the fixtures are off and the batteries are charging. When normal power drops out, the fixtures illuminate, powered by the stored battery energy. A common application of these fixtures are the "bug-eye" type fixtures found in corridors or stairwells

  Emergency-only fixtures are an easy and cost-effective way to achieve emergency lighting requirements, but they present several challenges including undesirable aesthetics, inability to control the fixtures, and energy inefficiencies in the case of 24/7 lighting.
- Normal/Emergency fixtures are those that can be controlled by a lighting control system. These fixtures are wired to both normal and emergency power sources. When normal power is lost, these fixtures receive power from an emergency source (e.g., generator or inverter), and are turned on by an automatic transfer switch. In emergency situations, local control is bypassed and emergency power can be overridden only by authorized personnel. Refer to the *Achieving lighting control requirements* section above, for additional details on this strategy.
- Normal/Emergency fixtures that contain emergency ballasts and LED drivers are similar to the emergency-only "bug-eye" fixtures in that they both contain a battery. These fixtures, however, can be controlled when normal power is present because they also contain a ballast or driver that is part of a lighting control system. When normal power is present, the battery charges and the fixture is controlled normally. When normal power is lost, the stored energy in the battery is used to power the emergency ballast or driver which in turn powers the lamps or LEDs. Emergency ballasts and drivers are commonly used in retrofit applications or installations that do not have a backup emergency source. Refer to the *Lutron Ballasts and Drivers* section beginning on page 12 for more details on integrating these products with Lutron solutions.

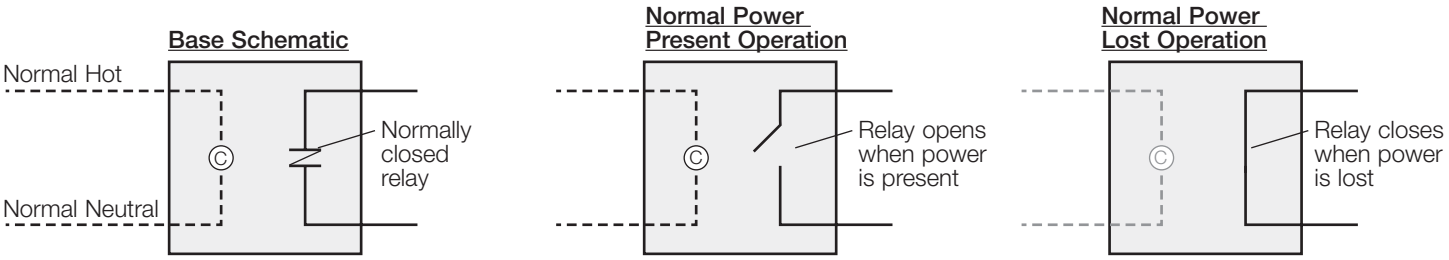
# Overview of Emergency Lighting Equipment (continued)

## Automatic Load Control Relays (ALCR)

Automatic Load Control Relays (ALCR) are UL® 924 listed devices that provide emergency power to lighting loads by bypassing the local control device in the event of a loss of power. In normal operation, the local control dims or switches the load. When normal power is lost, the ALCR bypasses the local control and provides the load with dedicated emergency power. There are many types of ALCRs with different mounting options and features (e.g., test switches and LEDs for system status). The diagrams on the following pages show different types of ALCRs that are commonly used on Lutron products.

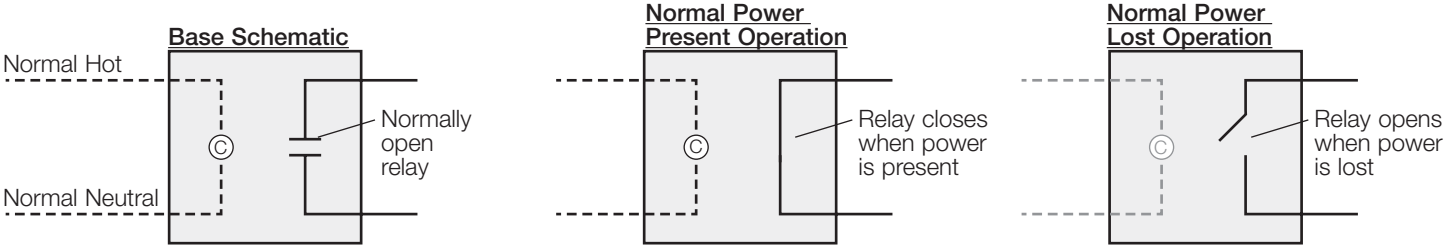
### With a normally closed relay (simple shunt relay)

An ALCR with a normally closed relay functions by sensing normal power and opening a relay when normal power is present. When normal power is lost, the relay closes and provides power to the load. These devices are typically found in simple switching and forward-phase 2-wire dimming applications when the control is being powered by emergency and the load is an emergency load. It cannot be used for advanced dimming such as 3-wire, 0-10 V⎓ or digital loads. Examples of this type of device are RRU-UM or LUT-SHUNT from LVS Controls.



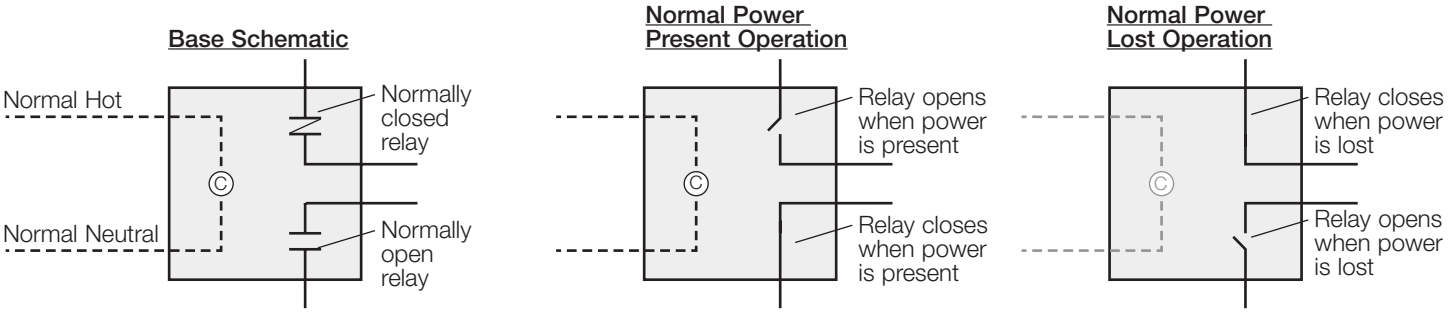

### With a normally open relay

An ALCR with a normally open relay functions by sensing normal power and closing a relay when normal power is present. When normal power is lost, the relay opens and breaks connection. These kinds of devices are typically found in applications where there is digital communication during normal operation. When normal power is lost, the connection breaks, causing the devices to go to high-end. Examples of this type of device are RRU-UM or LUT-SHUNT from LVS Controls.




### With a normally open and a normally closed relay

An ALCR with a normally open and a normally closed relay functions by sensing normal power and closing a relay, while opening another when normal power is present. When normal power is lost, the normally closed relay closes and the normally open relay opens. These kinds of devices are typically found in 0-10 V⎓ applications where the control is being powered by a normal/emergency line voltage feed. An example of this type of device is RRU-X-UM or LUT-SHUNT-D from LVS Controls.

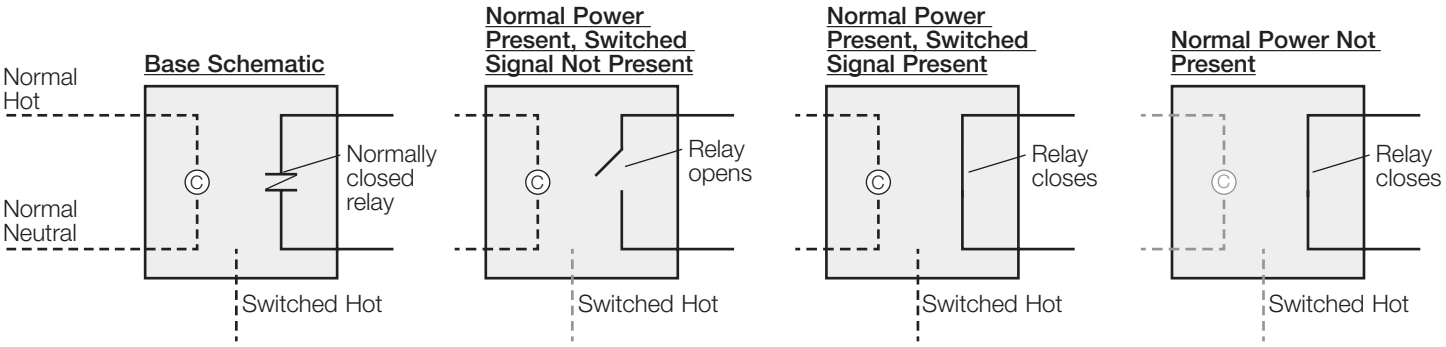


# Overview of Emergency Lighting Equipment (continued)

## Automatic Load Control Relays (ALCR) (continued)

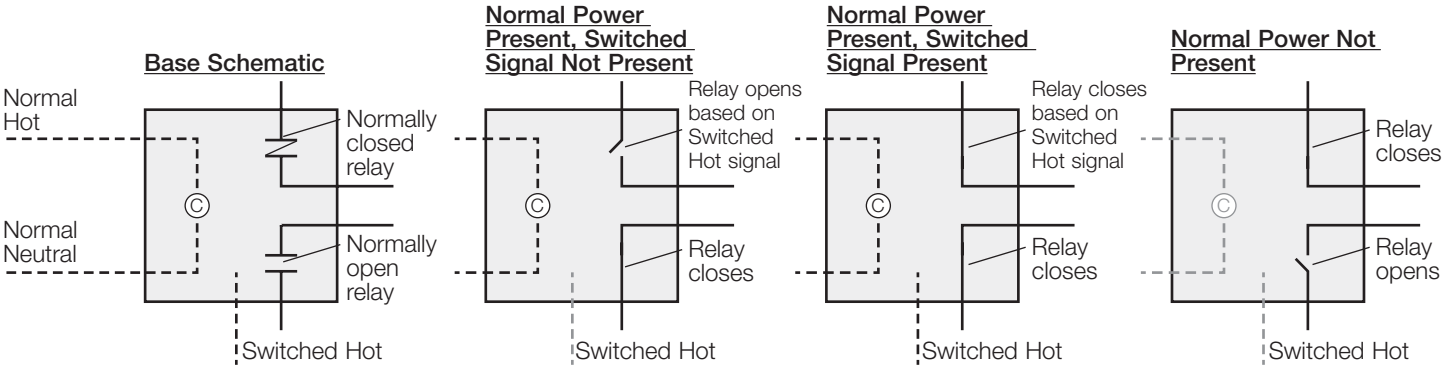
### With a normally closed relay that responds to a switched hot signal

An ALCR with a normally closed relay that responds to a switched hot signal functions by sensing normal power and a switched hot signal. When normal power is present and the switched hot signal has voltage, the relay closes. When normal power is present and the switched hot signal does not have power, the relay opens. When normal power is not present the relay latches closed. Examples of this type of device are EPC-A-1, EPCV-1 and EPC-PM from LVS Controls.




### With a normally open and a normally closed relay that responds to a switched hot signal

An ALCR with a normally open/normally closed relay that responds to a switched hot signal functions by sensing normal power and a switched hot signal. When normal power is present and the switched hot signal has voltage, the normally closed relay closes, and the normally open relay stays closed. When normal power is present and the switched hot signal does not have power, the normally closed relay opens, while the normally open relay stays closed. When normal power is not present the normally closed relay latches closed and the normally open relay latches open. This type of device is typically used for 0-10 V⎓ applications when the control is on normal power, but the load is an emergency load. An example of this type of device is EPC-1-D from LVS Controls or LUT-ALCR-D from Lutron.

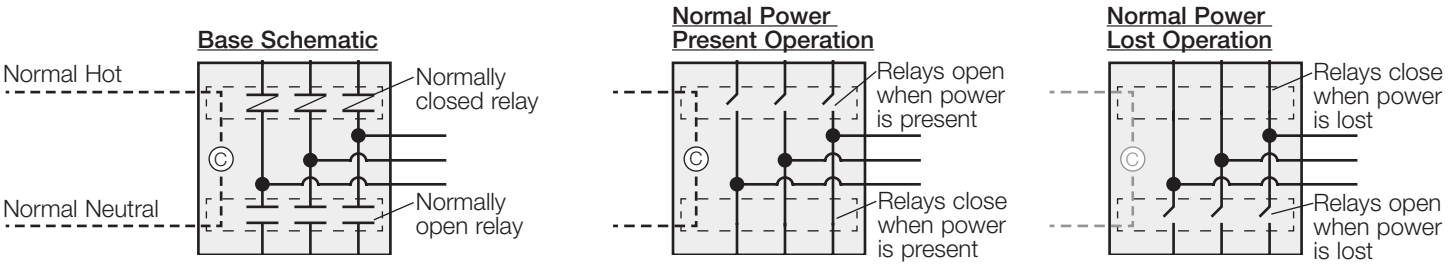


# Overview of Emergency Lighting Equipment (continued)

## Automatic Load Control Relays (ALCR) (continued)

### With multiple normally open and multiple normally closed relays

An ALCR with multiple normally open and multiple normally closed relays functions by sensing normal power and closing multiple relays, while opening the other set of relays. When normal power is present, the normally open relays are closed, and the normally closed relays are open. When normal power is lost, the normally closed relays close and the normally open relays open. These kinds of devices are typically called load side transfer devices. They are often used for line voltage dimming and 3-wire dimming applications where the control is being powered by a normal line voltage feed, but the load is an emergency load. An example of this type of device is EPC-D-F from LVS Controls or LUT-ATS-D from Lutron.



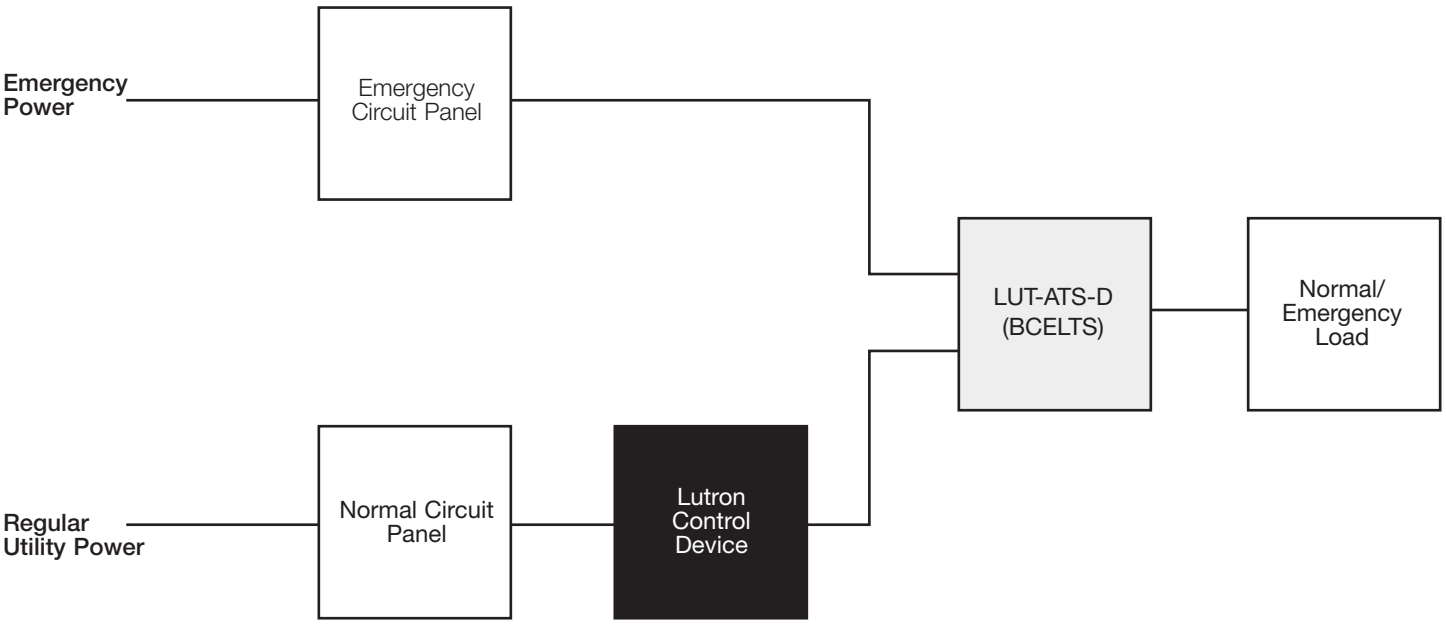
## Overview of Emergency Lighting Equipment (continued)

### Branch Circuit Emergency Lighting Transfer Switch

Starting in 2017, the National Electric Code Article 700.2 defines a Branch Circuit Emergency Lighting Transfer Switch (BCELTS) as a device connected on the load side of a branch circuit overcurrent protective device that transfers only emergency lighting loads from the normal supply to an emergency supply.

The National Electric Code Article 700.25 recognizes that “Emergency Lighting loads supplied by branch circuits rated at not greater than 20 amperes shall be permitted to be transferred from the normal branch circuit to an emergency branch circuit using a listed branch circuit emergency lighting transfer switch.” This differs from an Automatic Transfer Switch (ATS), which would be wired into the input of a distribution panel.

Unlike an ALCR which is listed to UL 924 and bypasses a control, a BCELTS is listed to UL1008 and provides the override and lockout of connected lighting loads through the internal transfer from Normal Power to Normal/Emergency Power. An example of a BCELTS is the LUT-ATS-D.




**Reference Key:**

- Black-filled icons are Lutron provided devices
- Gray-filled icons can be provided by the local Lutron Representative or LVS Representative, contact your local Lutron Representative for details.
- White-filled icons are provided by others.

# Applications of Emergency Lighting with Lutron Systems

In this section, the text and wiring diagrams explain how various Lutron systems work with emergency lighting applications and other third-party equipment. Additional information about designing emergency lighting systems, in particular using the Lutron LUT-ELI device, is included. All information presented here is for reference only. Always check the appropriate codes and standards, the Authority Having Jurisdiction (AHJ), and the installation instructions for the requirements of all equipment included in the design of an emergency lighting system.

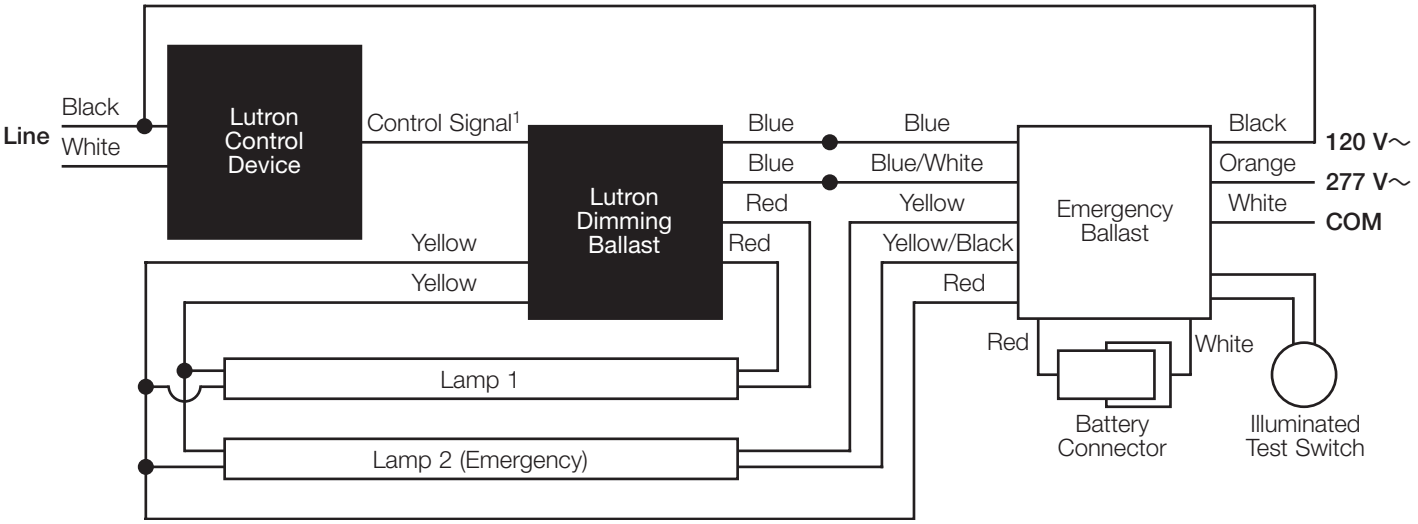
## Lutron Ballasts, Drivers and and In-Fixture Controllers

### Emergency Ballasts

Emergency ballasts are a common way to achieve emergency lighting requirements for applications without an emergency power source. These ballasts, along with a battery, are installed in the same fixture as the dimming ballast, and are widely-available from several manufacturers (e.g., Iota, Power Sentry, Phillips Bodine). When normal power is present, the battery is charged by means of a constant hot connection to the emergency ballast while the dimming ballast controls the lamps. When normal power is lost, the emergency ballast uses the battery's stored energy to illuminate one or multiple lamps. The sample wiring diagram below illustrates how a Lutron ballast may integrate with an emergency ballast; it might not apply to all applications. Consult the manufacturer's installation instructions for wiring details. Follow these guidelines when using this technology with Lutron dimming ballasts:

- Lutron ballasts are designed to provide lamps with the precise voltage necessary to ensure long lamp life, flicker-free performance, and lamp balance. The addition of an emergency ballast should not significantly alter the amount of voltage that is delivered to the lamp and filaments. Lutron recommends choosing emergency ballasts from manufacturers who understand these considerations.
- Always keep the lamp wires as short as possible. The specified total lamp wire length for Lutron ballasts includes the wire length of the backup device.
- Depending on the fixture layout, there might be a slight imbalance of illumination on a multi-lamp ballast during normal operation.

**Wiring Schematic**




**Note**

[1] Lutron dimming ballasts can be controlled by 3-wire dimming or EcoSystem control. Wiring will vary, based on application and types of ballasts used. Refer to manufacturer's installation instructions for wiring details.

# Applications of Emergency Lighting with Lutron Systems (continued)

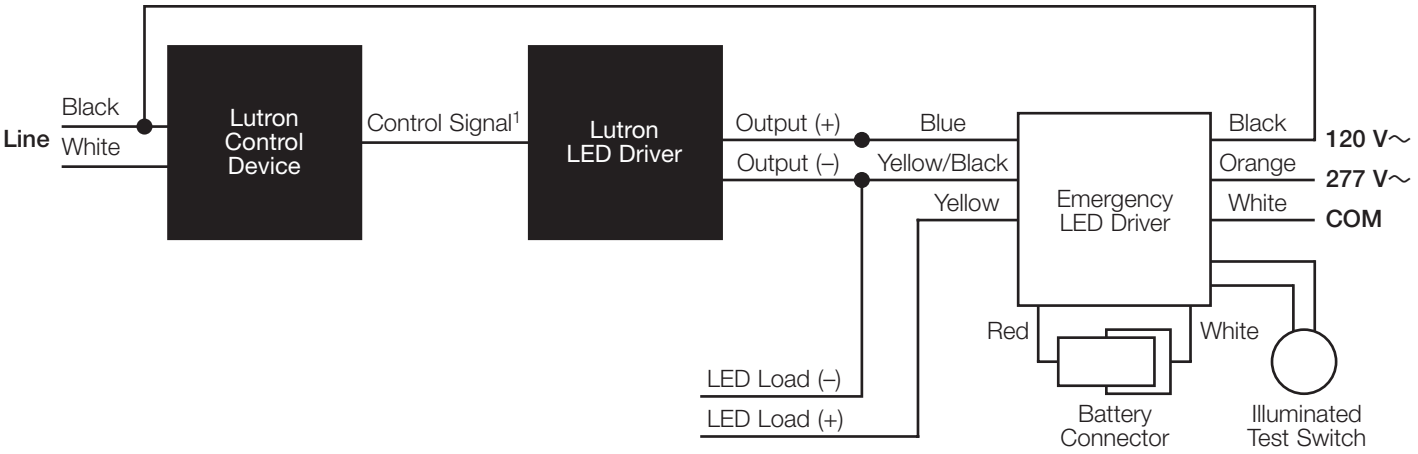
## Lutron Ballasts, Drivers and and In-Fixture Controllers (continued)

### Emergency LED Drivers

Emergency LED drivers, available from several manufacturers (e.g., Iota and Phillips Bodine), operate almost identically to emergency ballasts. The normal LED dimming driver, the emergency LED driver, optional in-fixture control, and the battery are all installed in the fixture. When normal power is present, the battery is charged by means of a constant hot connection to the emergency LED driver while the LED dimming driver controls the LEDs. When normal power is lost, the emergency LED driver uses the battery's stored energy to power the LEDs. The sample wiring diagram below illustrates how a normal LED driver may integrate with an emergency LED driver; it might not apply to all applications. Consult the manufacturer's installation instructions for wiring details. Follow these guidelines when using this technology with Lutron LED drivers:

- The addition of an emergency LED driver can potentially increase the LED load voltage of the Lutron LED driver beyond its specified operating range. When selecting emergency LED drivers, consider additional margin for LED load voltage and choose emergency drivers that minimize this voltage.
- Lutron LED drivers can control LEDs in constant voltage or constant current modes over a wide range of currents and voltages. The emergency LED driver must be properly chosen to operate within the maximum specifications of the Lutron LED driver and fixture LED array.
- Emergency LED drivers are meant to provide enough illumination to satisfy the required footcandle levels for egress. These levels are typically below the full output capacity of the fixture. Consult the manufacturer's specifications to determine the output capacity of the emergency LED driver.
- Always keep load wiring as short as possible. The specified total load wire length for Lutron LED drivers includes the wire length of the backup device.

**Wiring Schematic for Fixtures without Integral Fixture Controllers**




**Note**

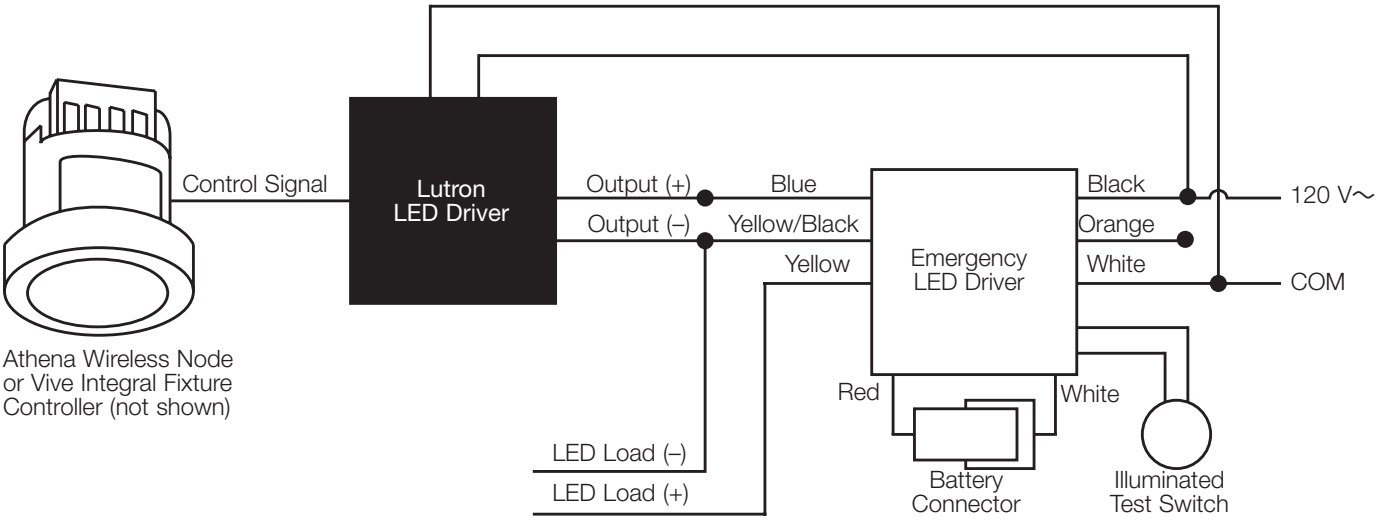
1 Lutron LED drivers can be controlled by forward-phase dimming, 3-wire dimming, DALI-2 Device Type 6, DALI-2 Device Type 8, EcoSystem or T-Series control. Wiring will vary, depending on application and types of emergency LED drivers used. Refer to manufacturer's installation instructions for wiring details.

## Applications of Emergency Lighting with Lutron Systems (continued)

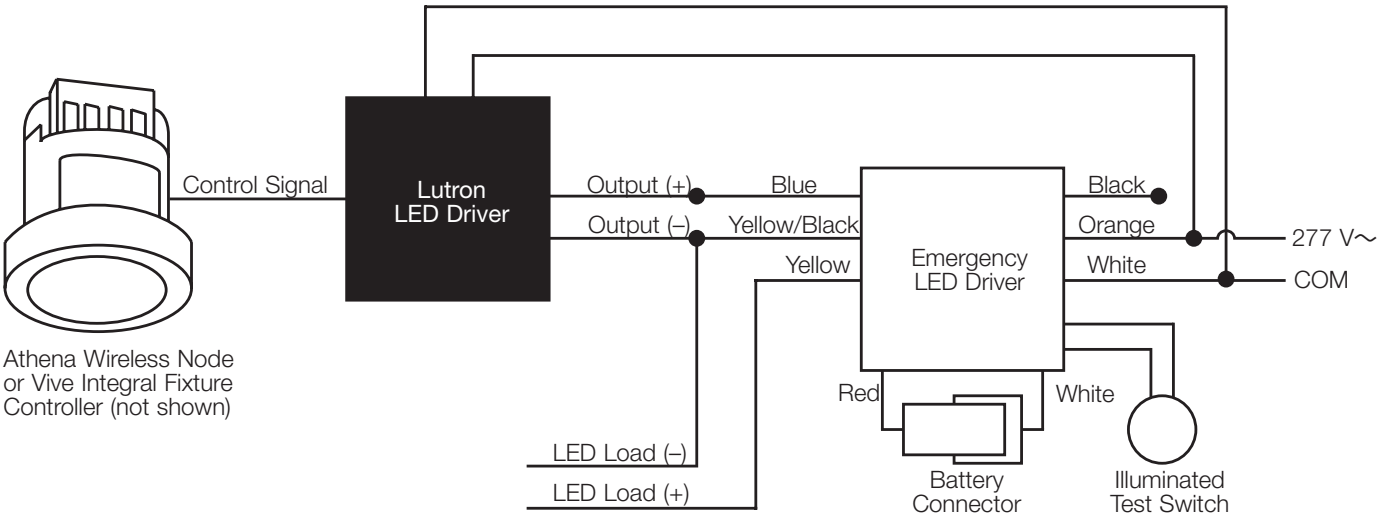
### Lutron Ballasts, Drivers and and In-Fixture Controllers (continued)

#### Emergency LED Drivers (continued)

**Wiring Schematic for Fixtures with Lutron Integral Fixture Controllers (Athena Wireless Node or Vive Integral Fixture Controller 120 V~)**




**Wiring Schematic for Fixtures with Lutron Integral Fixture Controllers (Athena Wireless Node or Vive Integral Fixture Controller 277 V~)**



# Applications of Emergency Lighting with Lutron Systems (continued)

## EcoSystem and DALI-2 Controls for Applications Complying with UL® 924 and Not Using the LUT-ELI

### Powered by Normal Power and Controlling Emergency Loads

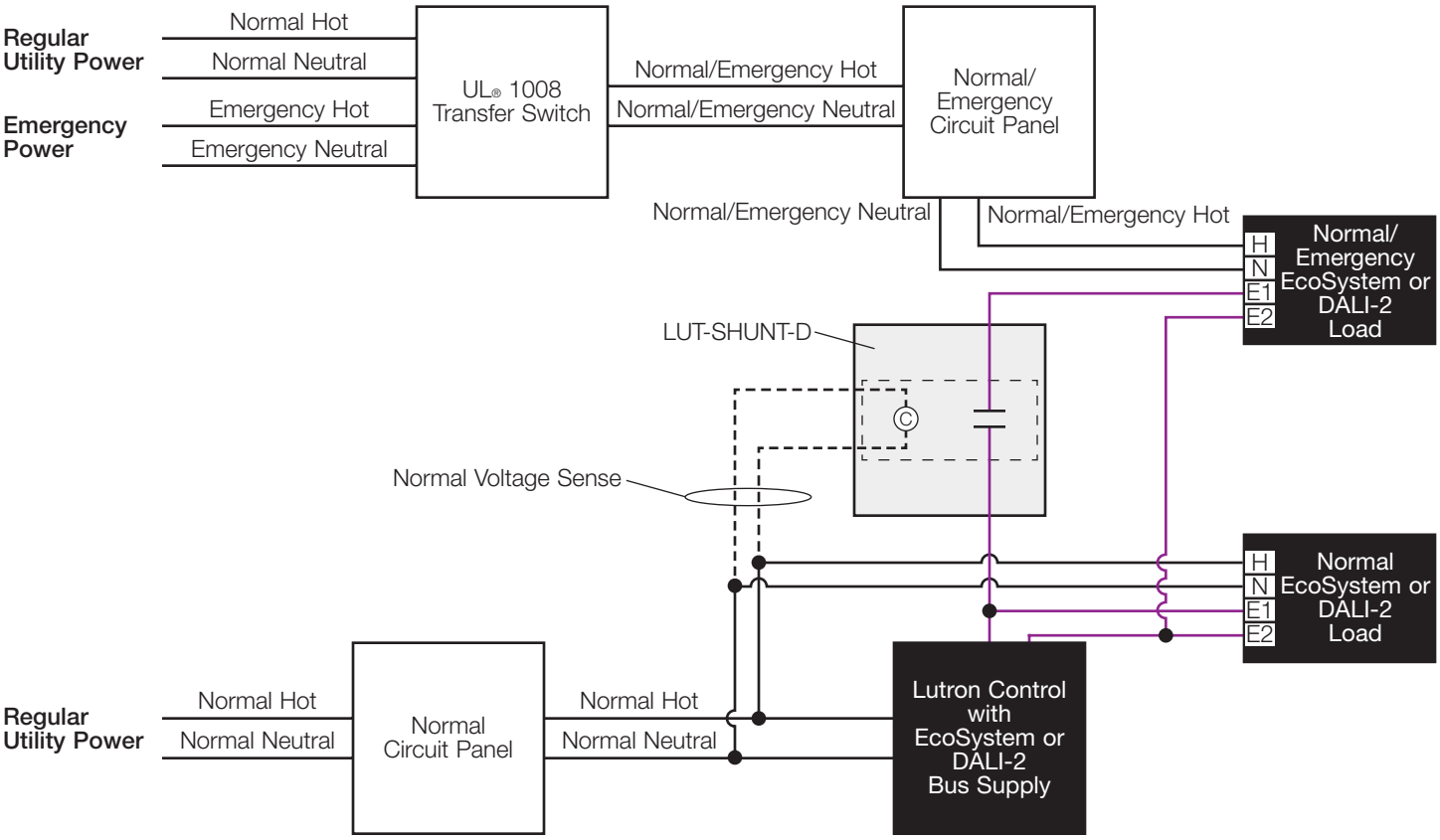
#### Using an ALCR for UL® 924 applications with EcoSystem and DALI-2 loads

For an application where an EcoSystem or DALI-2 control (referred to as "digital" control herinafter) is powered by normal power and controlling emergency loads, an ALCR with a normally open relay may be used to achieve UL® 924. Digital loads are controlled using two digital communication wires that are run as either NEC® Class 1 or Class 2. One of the digital wires must pass through a normally open relay to ensure that, when normal power is lost, the communication link opens and the digital loads go to their emergency level. This emergency level is programmed during setup. Upon normal power loss, the normal loads will turn off because they lose power. The emergency fixtures stay powered since they are fed from a Normal/Emergency feed. An example of this type of device is LUT-SHUNT-D from LVS Controls. This application is illustrated below. Lutron EcoSystem controls include:

- Energi Savr Node with EcoSystem[1]
- Energi Savr Node DALI® Universal[1]
- GRAFIK Eye QS control unit with EcoSystem[1]
- PowPak dimming module with EcoSystem
- PowPak Wireless Fixture Controller with EcoSystem[2]
- Quantum QP2 hub with EcoSystem Bus Supply[1]
- Energi Savr Node EcoSystem DIN module

**Important Note:** The drivers must not supply power to the digital communication link; emergency lighting will not function properly if the driver supplies power on the digital link.

**Wiring Schematic**




**Note**

1 Lutron recommends using the LUT-ELI with these products.

2 Wiring this way will not give accurate power measurements.

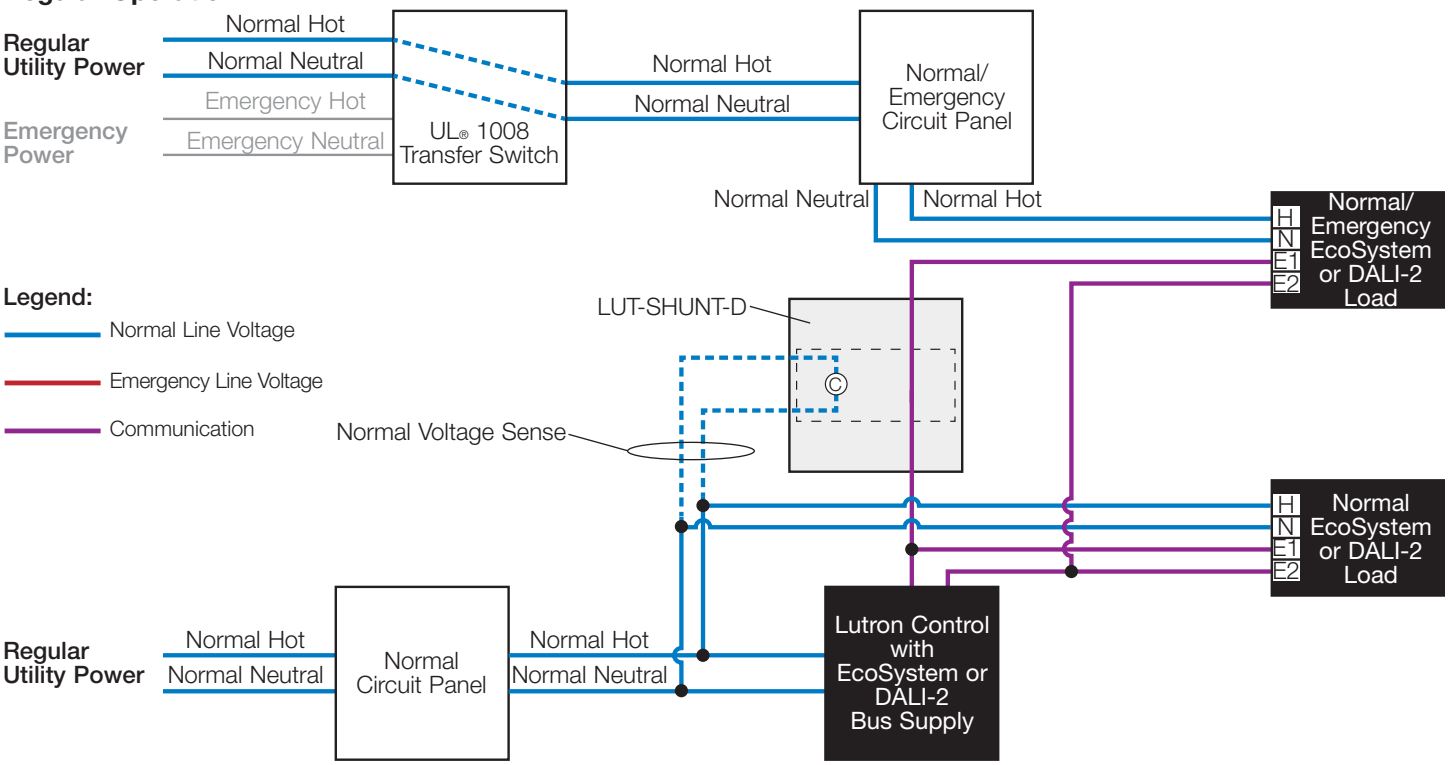
# Applications of Emergency Lighting with Lutron Systems (continued)

## EcoSystem and DALI-2 Controls for Applications Complying with UL® 924 and Not Using the LUT-ELI (continued)

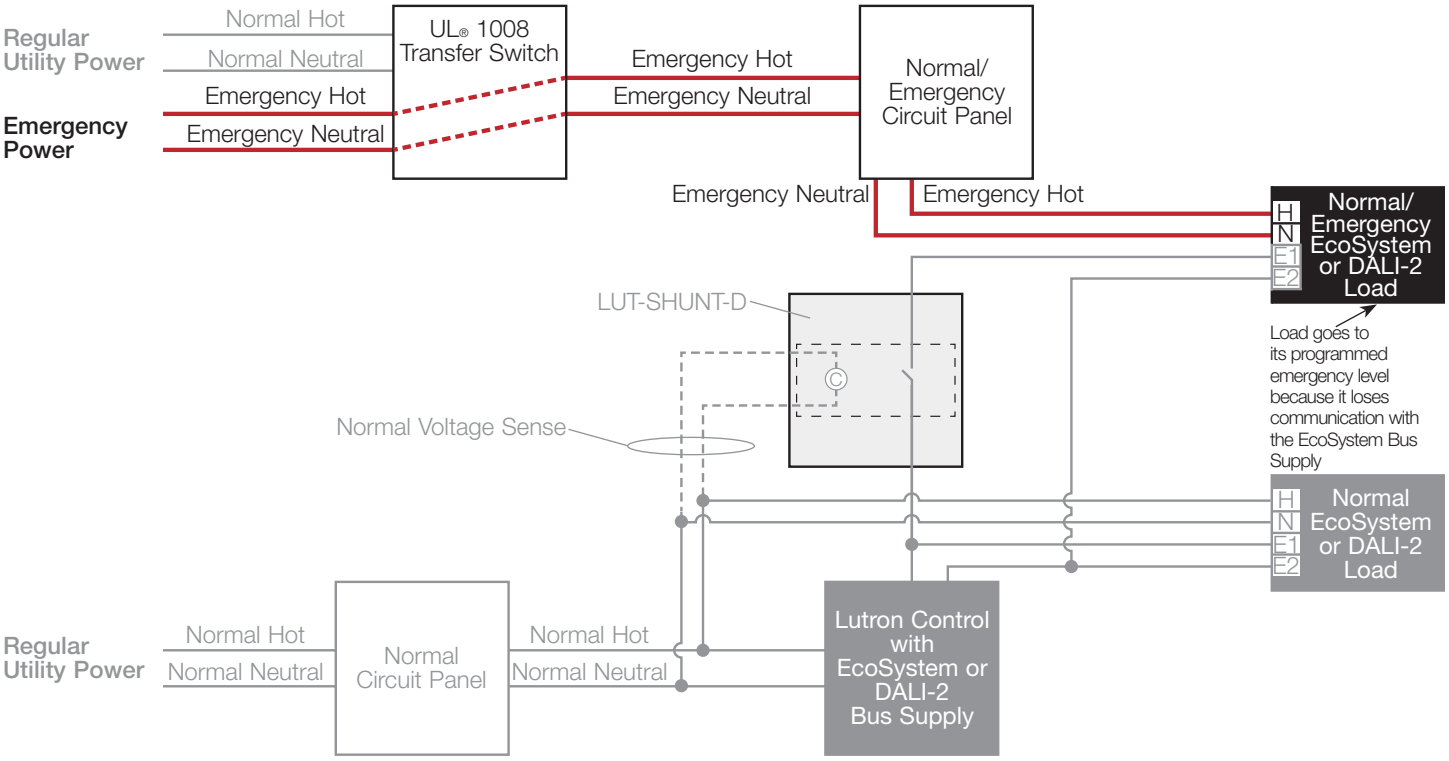
### Powered by Normal Power and Controlling Emergency Loads (continued)

### Using an ALCR for UL® 924 applications with EcoSystem and DALI-2 loads (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

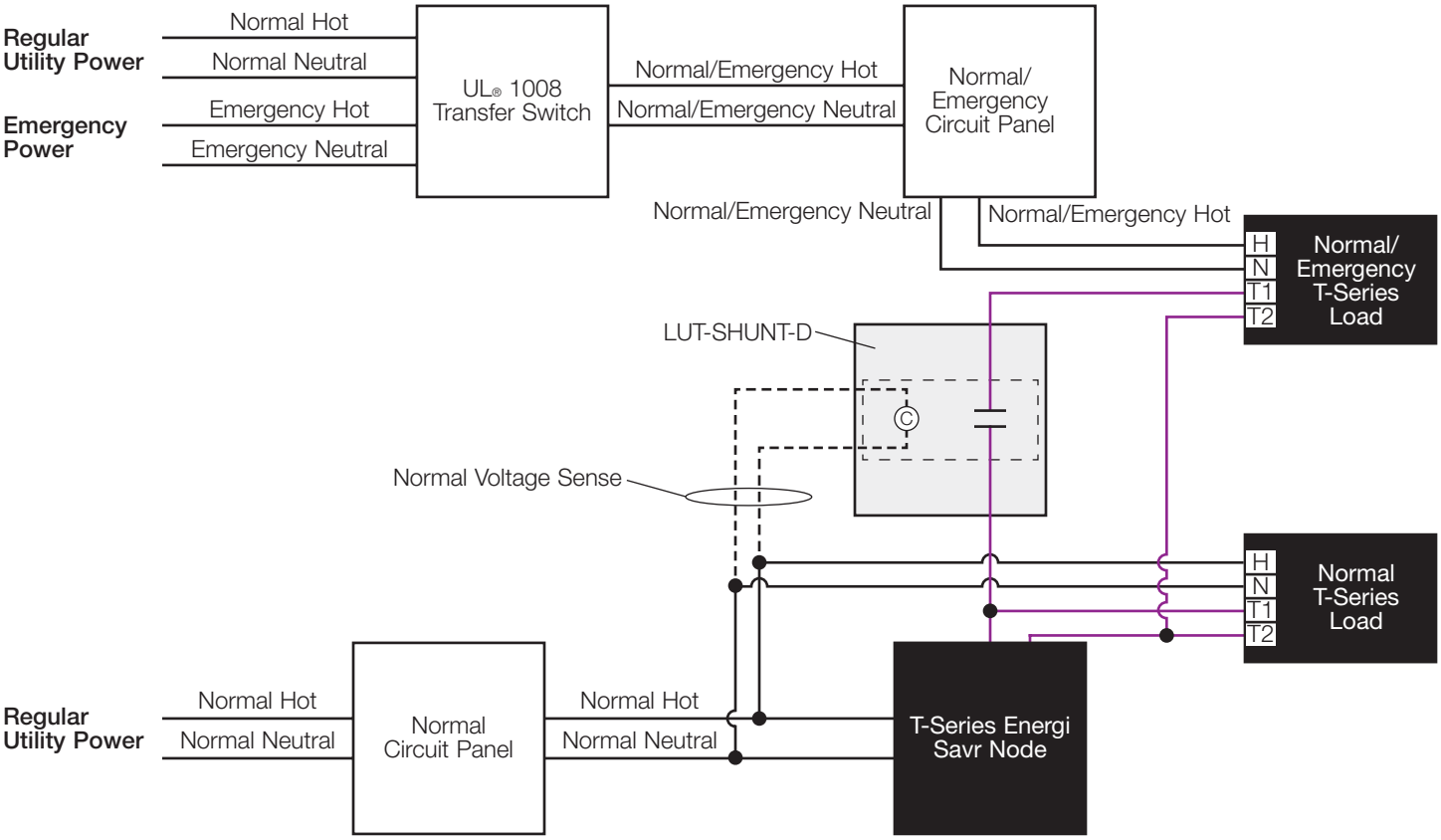
## T-Series Controls for Applications Complying with UL® 924 and Not Using the LUT-ELI Powered by Normal Power and Controlling Emergency Loads

### Using an ALCR for UL® 924 applications with T-Series loads

For an application where a T-Series control is powered by normal power and controlling emergency loads, an ALCR with a normally open relay may be used to achieve UL® 924. T-Series loads are controlled using two digital communication wires that are run as either NEC® Class 1 or Class 2. One of the T-Series wires must pass through a normally open relay to ensure that, when normal power is lost, the communication link opens and the T-Series loads go to their emergency level. This emergency level for intensity and color temperature is programmed during setup. Upon normal power loss, the normal loads will turn off because they lose power. The emergency fixtures stay powered since they are fed from a Normal/Emergency feed. An example of this type of device is LUT-SHUNT-D from LVS Controls. This application is illustrated below. Lutron T-Series controls include:

– T-Series Energi Savr Node[1]

**Wiring Schematic**




**Note**

[1] Lutron recommends using the LUT-ELI with these products.

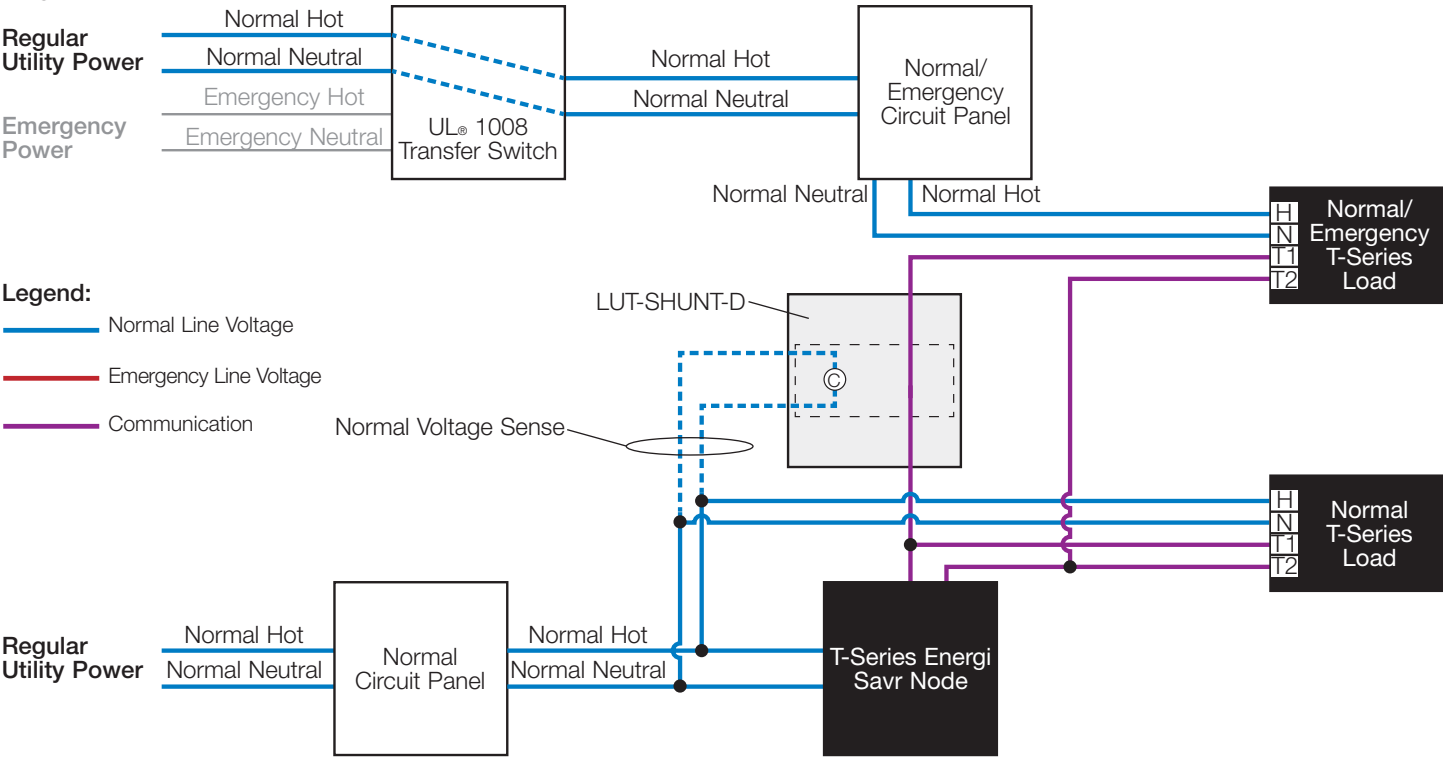
# Applications of Emergency Lighting with Lutron Systems (continued)

## T-Series Controls for Applications Complying with UL® 924 and Not Using the LUT-ELI (continued)

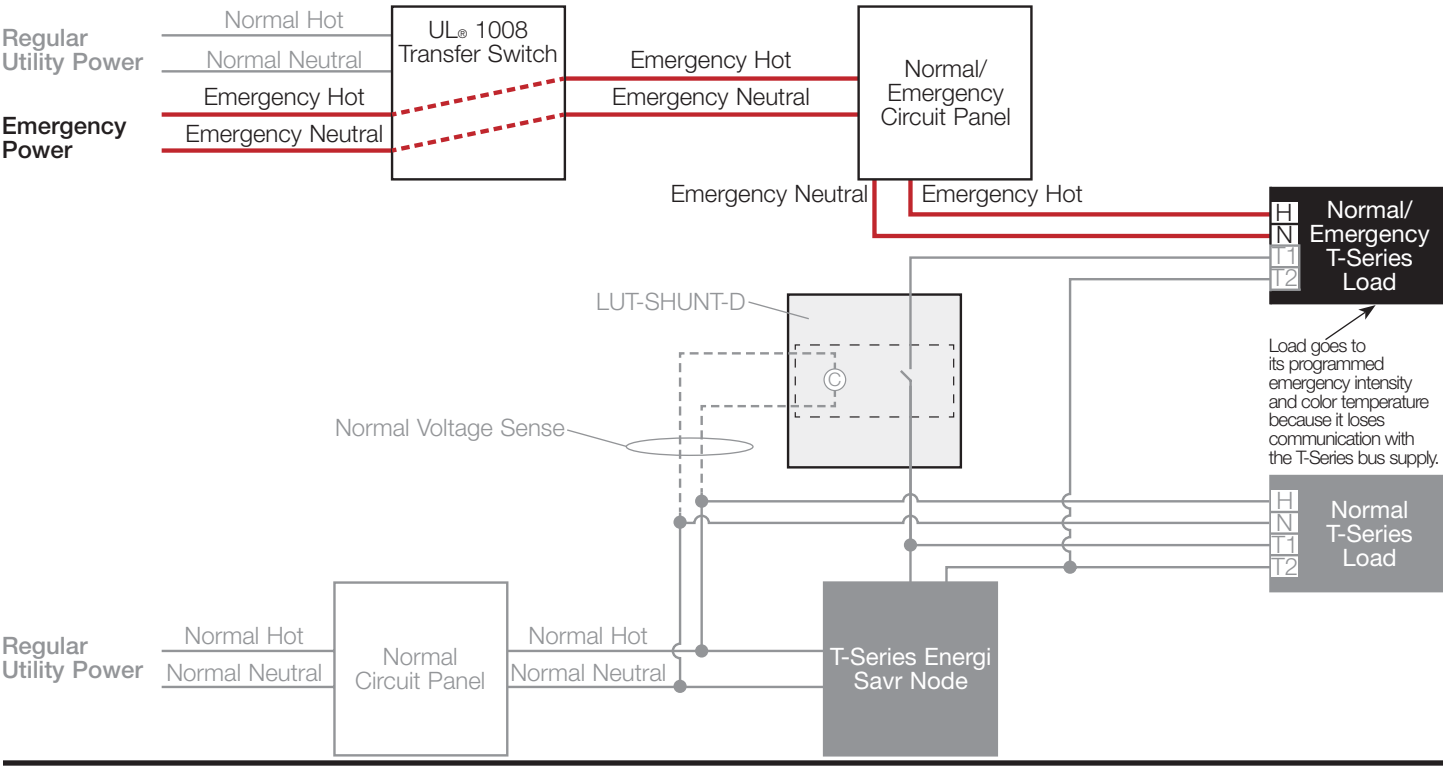
### Powered by Normal Power and Controlling Emergency Loads (continued)

### Using an ALCR for UL® 924 applications with T-Series loads (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## EcoSystem Controls Not Complying with UL® 924

### Powered by Normal Power and Controlling Emergency Loads

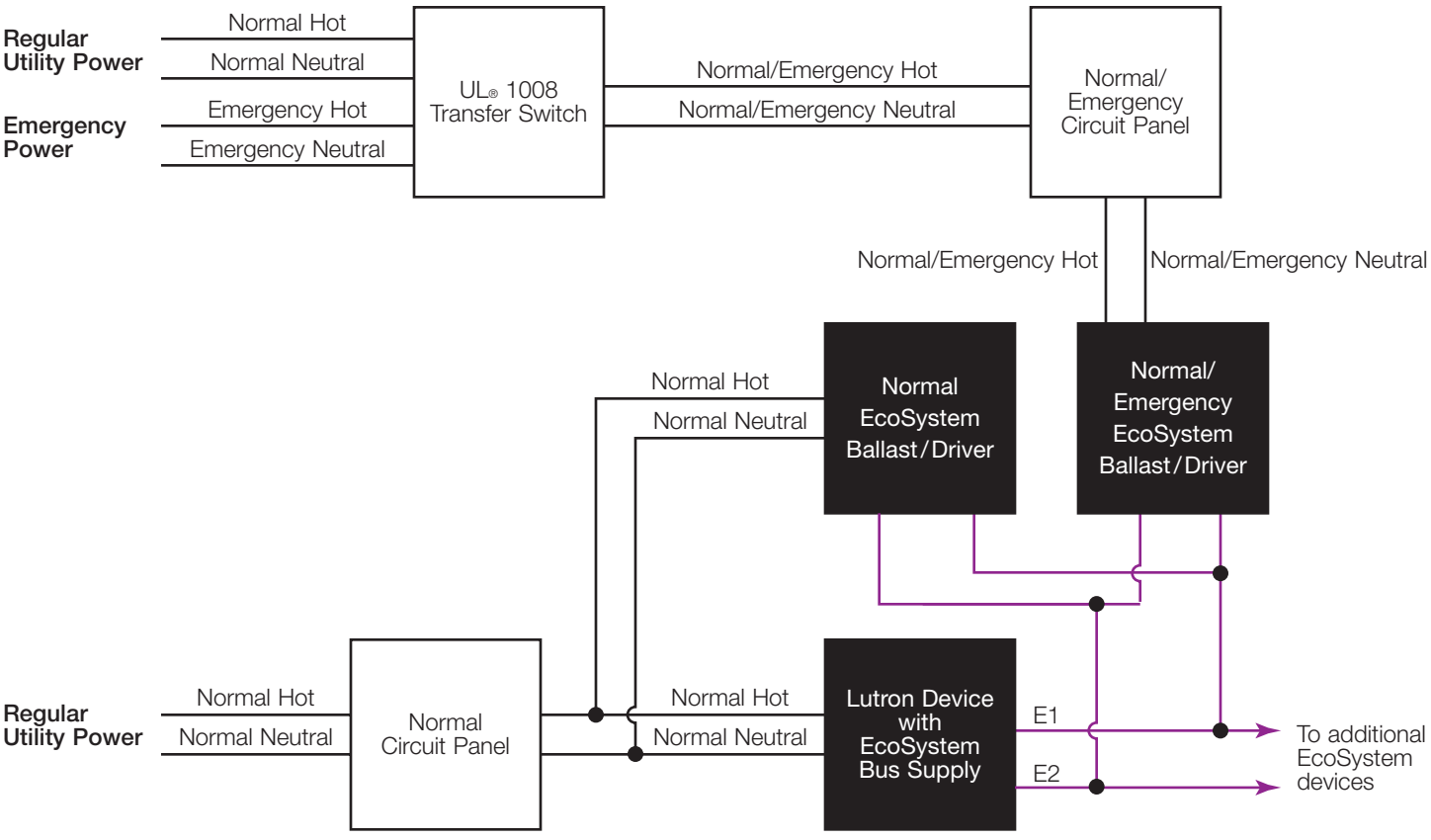
#### Controlling normal and normal/emergency EcoSystem loads and not requiring UL® 924

The EcoSystem bus wiring consists of two digital communication wires, E1 and E2, that are run as either NEC® Class 1 or Class 2 wires in addition to the line-voltage power for the load. An EcoSystem ballast or driver can be supplied with either normal or normal/emergency power. When the EcoSystem bus controller loses power, all loads on the bus will go to 100% by default.

For applications not requiring UL® 924, the appropriate drivers/ballasts can be supplied with normal/emergency power and the EcoSystem bus supply with normal power. The emergency ballasts will operate with the system when normal power is on. When normal power is lost, the EcoSystem bus supply will lose power and all emergency ballasts will go to 100% by default. Lutron EcoSystem controls include:

- GRAFIK Eye QS control unit with EcoSystem
- PowPak dimming module with EcoSystem
- PowPak Wireless Fixture Controller with EcoSystem[1]
- Energi Savr Node with EcoSystem
- Quantum QP2 hub with EcoSystem Bus Supply

**Wiring Schematic**




**Note**

[1] Wiring this way will not give accurate power measurements.

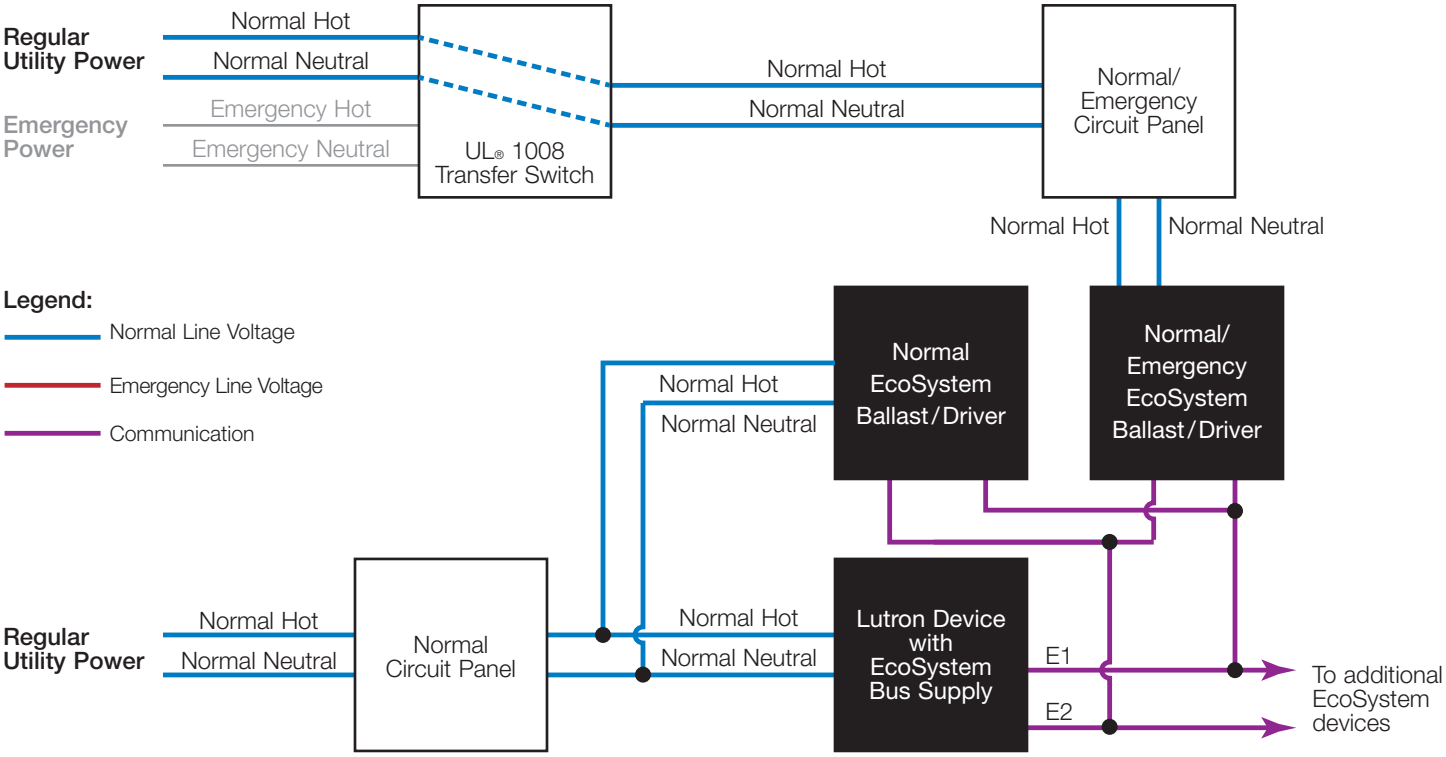
# Applications of Emergency Lighting with Lutron Systems (continued)

## EcoSystem Controls Not Complying with UL® 924 (continued)

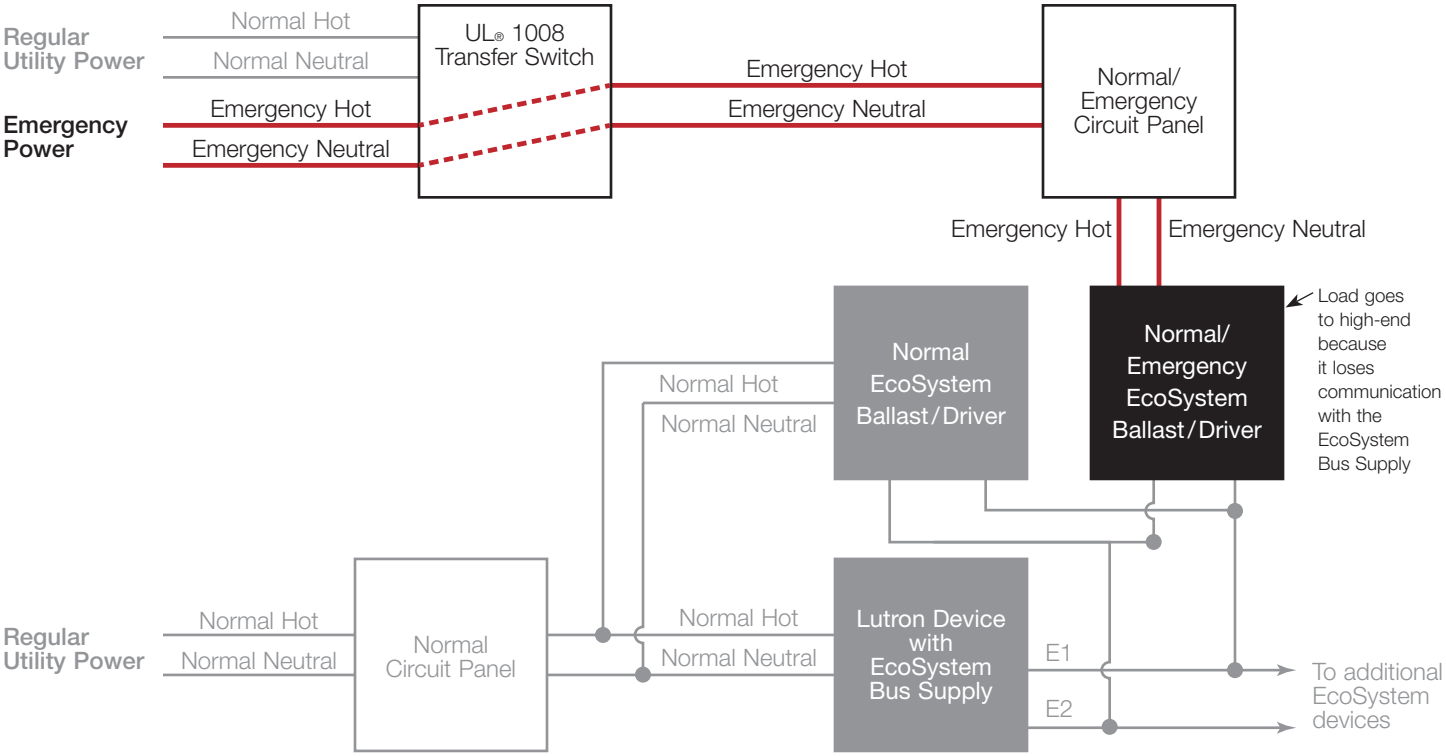
### Powered by Normal Power and Controlling Emergency Loads (continued)

#### Controlling normal and normal/emergency EcoSystem loads and not requiring UL® 924 (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## T-Series Controls Not Complying with UL® 924

### Powered by Normal Power and Controlling Emergency Loads

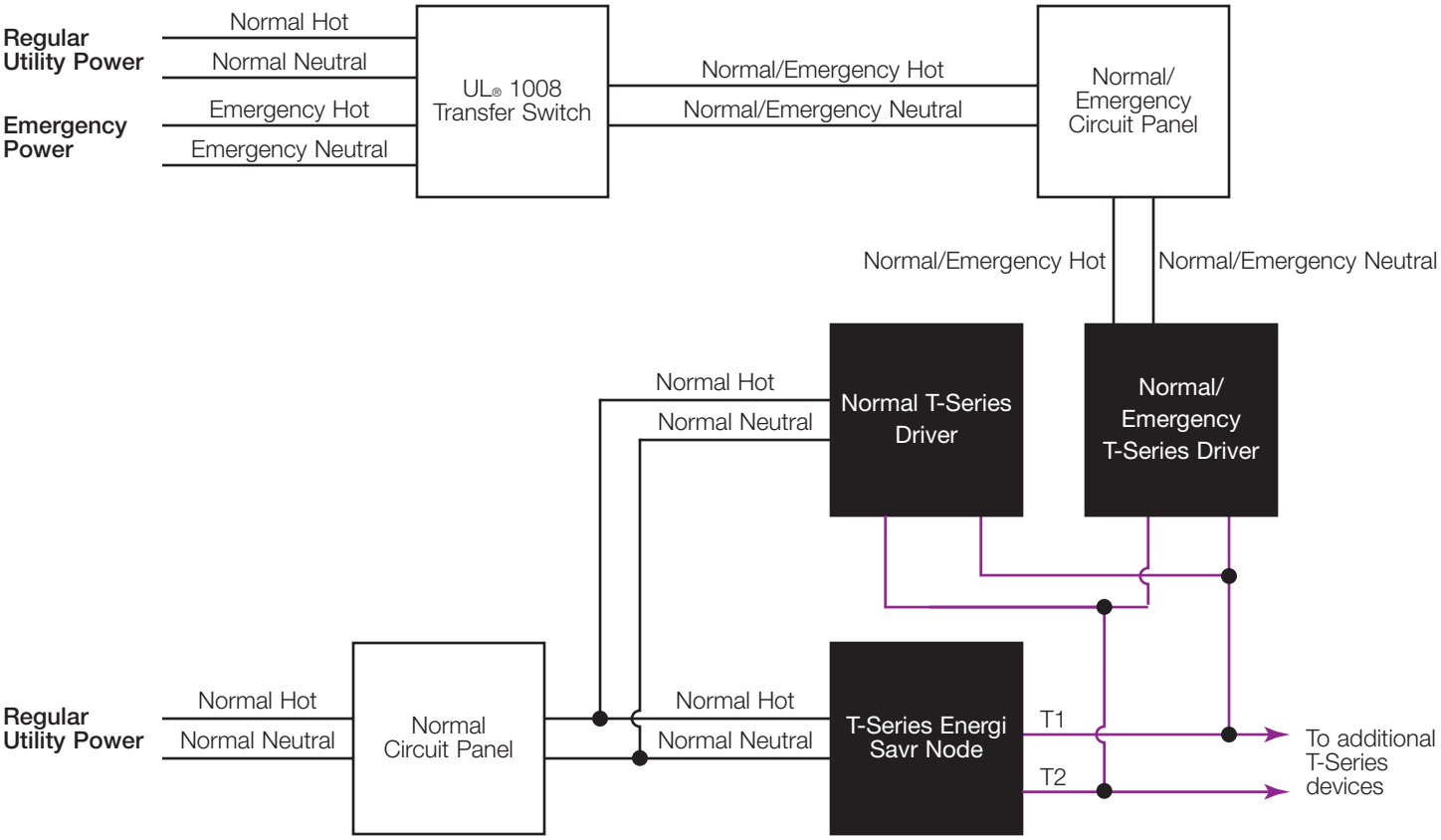
#### Controlling normal and normal/emergency T-Series loads and not requiring UL® 924

The T-Series bus wiring consists of two digital communication wires, T1 and T2, that are run as either NEC® Class 1 or Class 2 wires in addition to the line-voltage power for the ballast. A T-Series driver can be supplied with either normal or normal/emergency power. When the T-Series bus controller loses power, all drivers on the bus will go to 100% by default.

For applications not requiring UL® 924, the appropriate drivers can be supplied with normal/emergency power and the T-Series bus supply with normal power. The emergency drivers will operate with the system when normal power is on. When normal power is lost, the T-Series bus supply will lose power and all emergency drivers will go to 100% by default. Lutron T-Series controls include:

– T-Series Energi Savr Node

**Wiring Schematic**



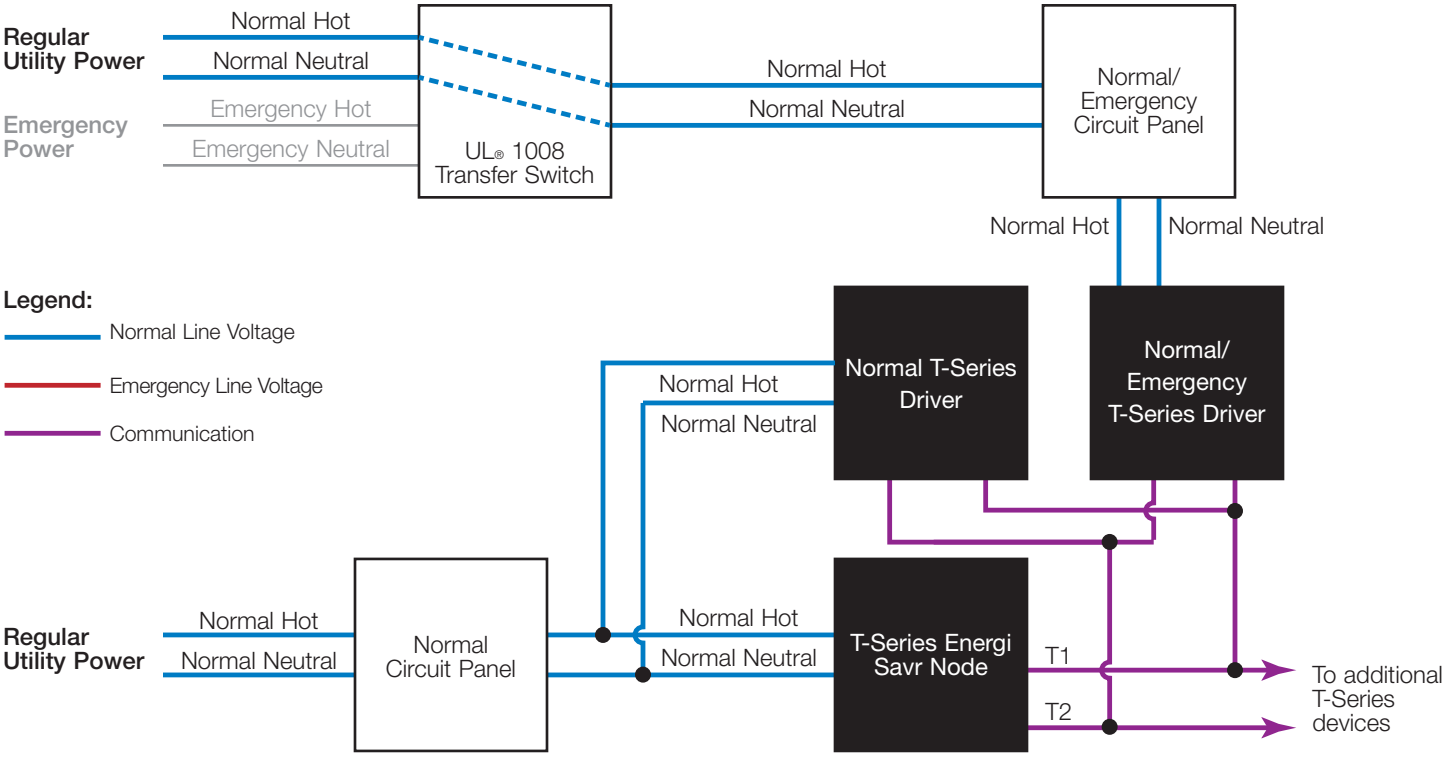
# Applications of Emergency Lighting with Lutron Systems (continued)

## T-Series Controls Not Complying with UL® 924 (continued)

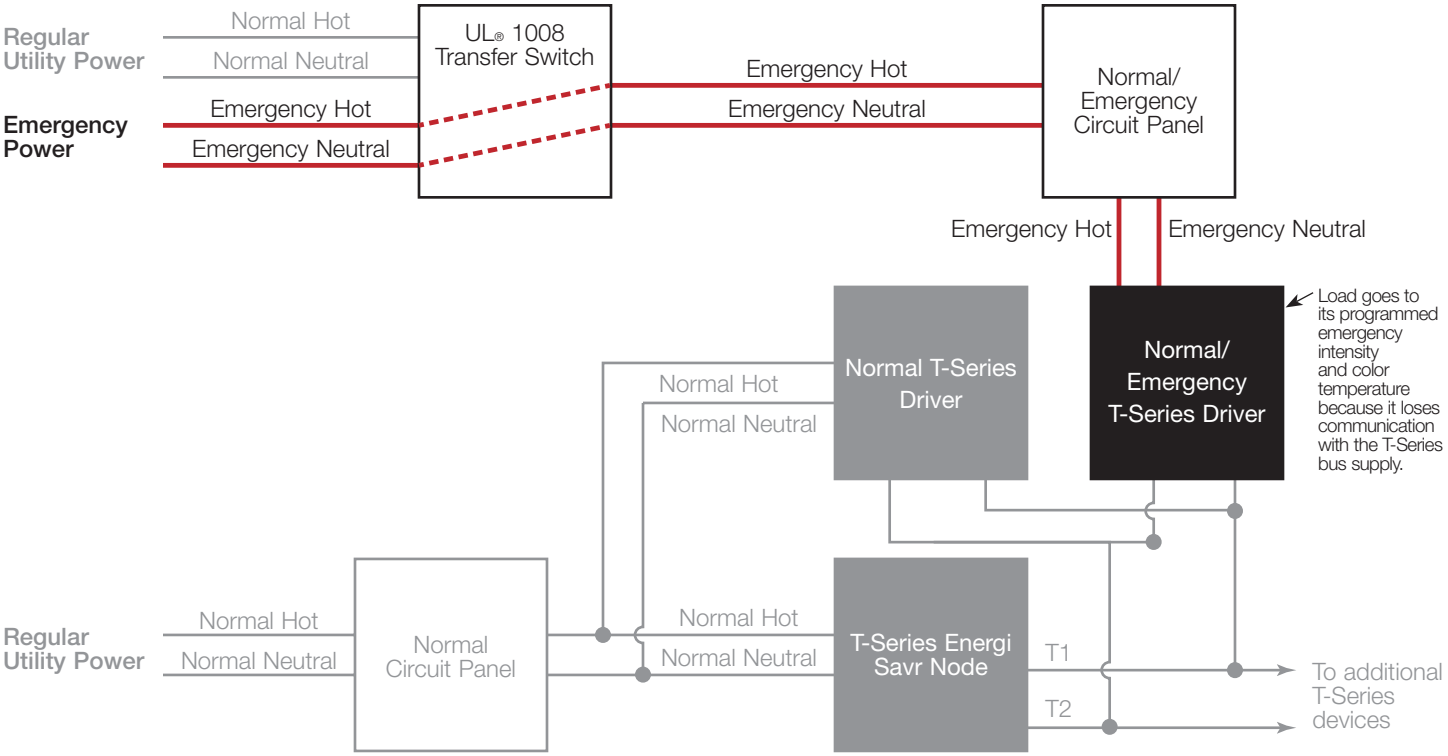
### Powered by Normal Power and Controlling Emergency Loads (continued)

#### Controlling normal and normal/emergency T-Series loads and not requiring UL® 924 (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage Switches and Forward-Phase Dimmers

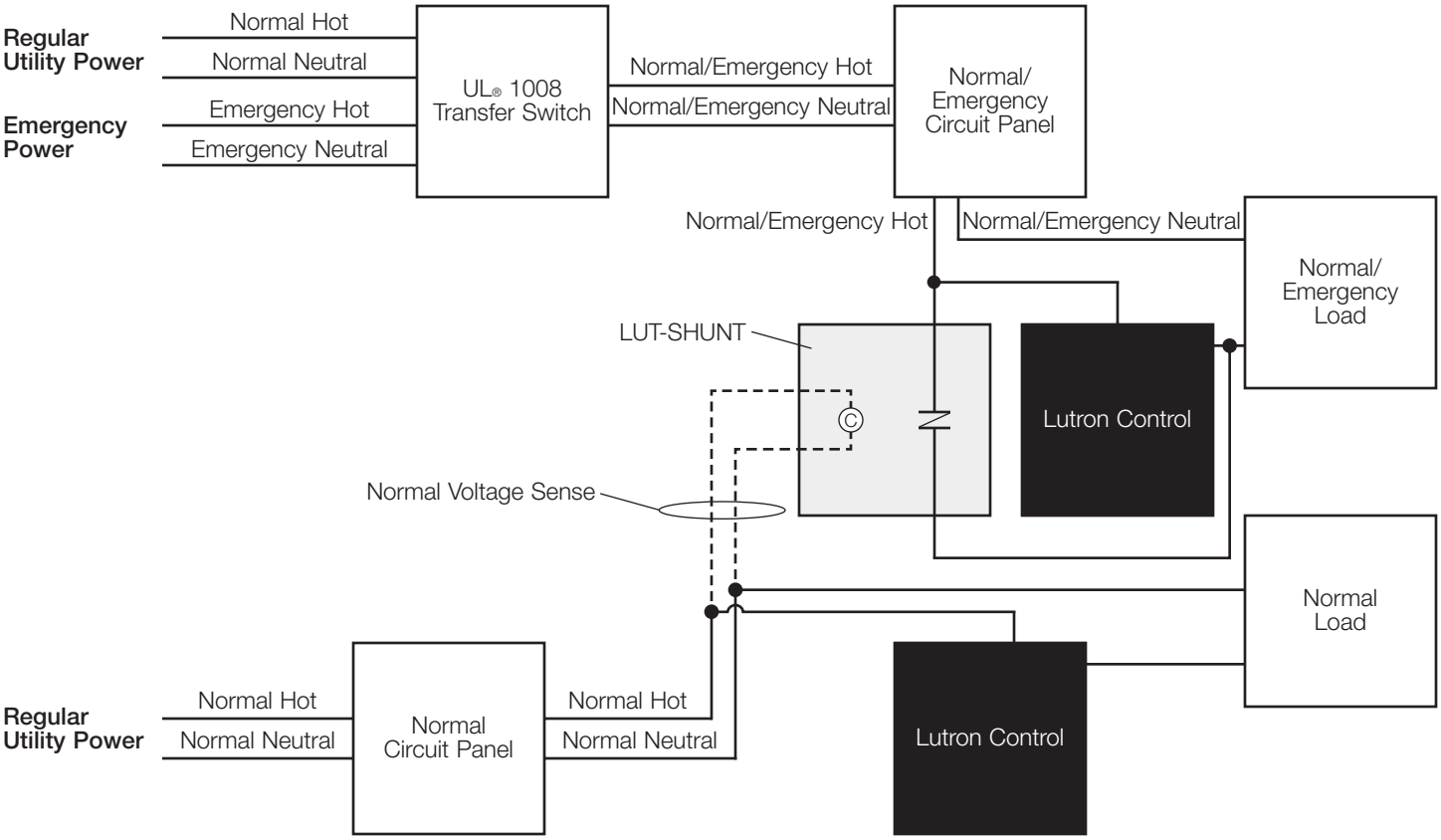
### Powered by a normal/emergency power and controlling an emergency load

#### Using an ALCR to control normal/emergency phase and switching fixtures

In the application where the control has power during an emergency, an ALCR with a normally closed relay (simple shunt relay) is used. During regular operation, normal power is present and the contact in the shunt relay is open, which allows the control to function. When normal power is lost, the contact in the shunt relay closes and bypasses the local control by providing power to the load. Simple shunt relays are not recommended for use with reverse phase dimmers. An example of an ALCR with a normally closed relay is LUT-SHUNT from LVS Controls. These shunt relays can be used with Lutron products, which include:

- Wallbox line voltage switches
- Wallbox forward-phase dimmers
- Power panels
- PowPak relay module with Softswitch
- PHPM-SW interface
- Energi Savr Node Softswitch[1]
- EcoSystem Softswitch module (C5-XPJ-16A)
- GRAFIK Eye QS[1]

**Wiring Schematic**




**Note**

[1] Using shunt relays on these products to meet UL® 924 is not recommended. Using the LUT-ELI is the recommended method.

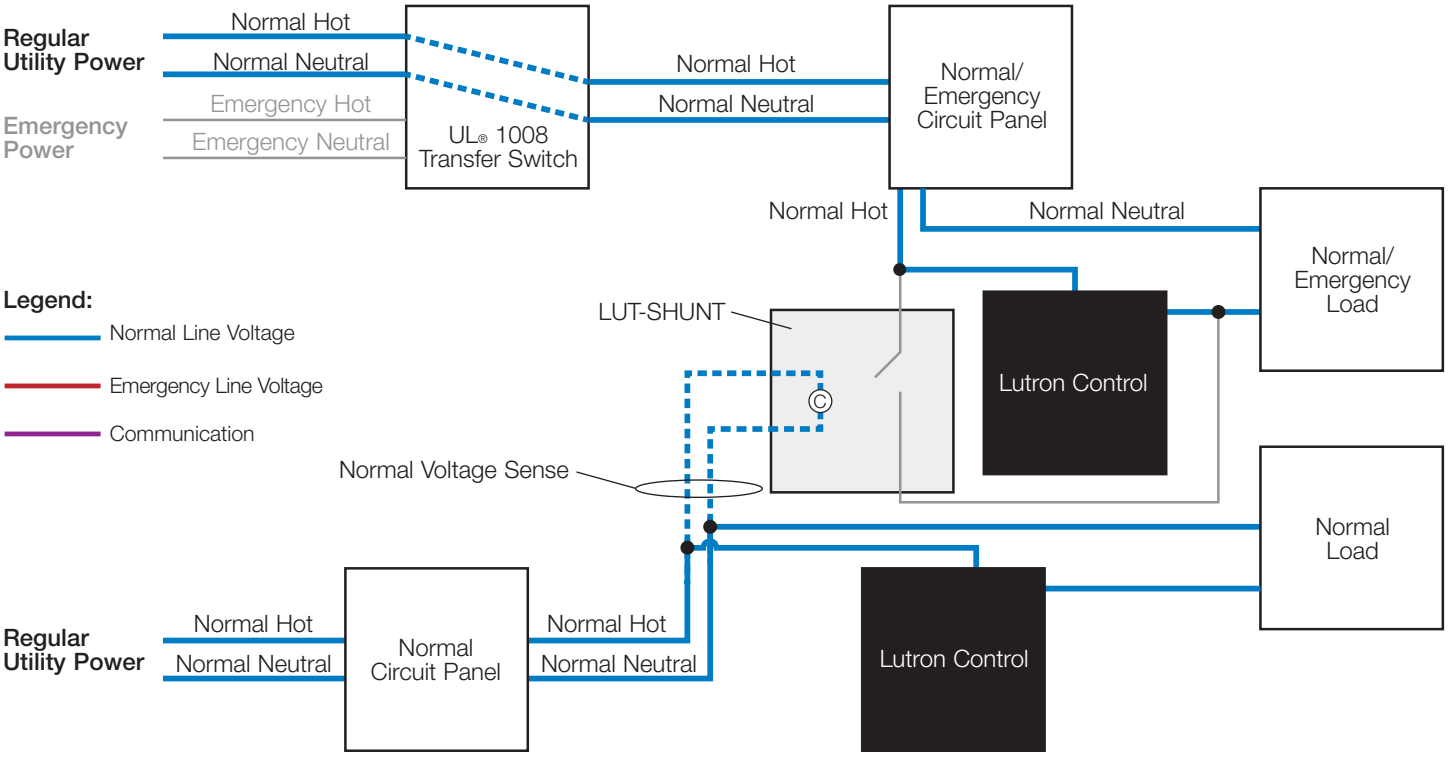
# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage Switches and Forward-Phase Dimmers (continued)

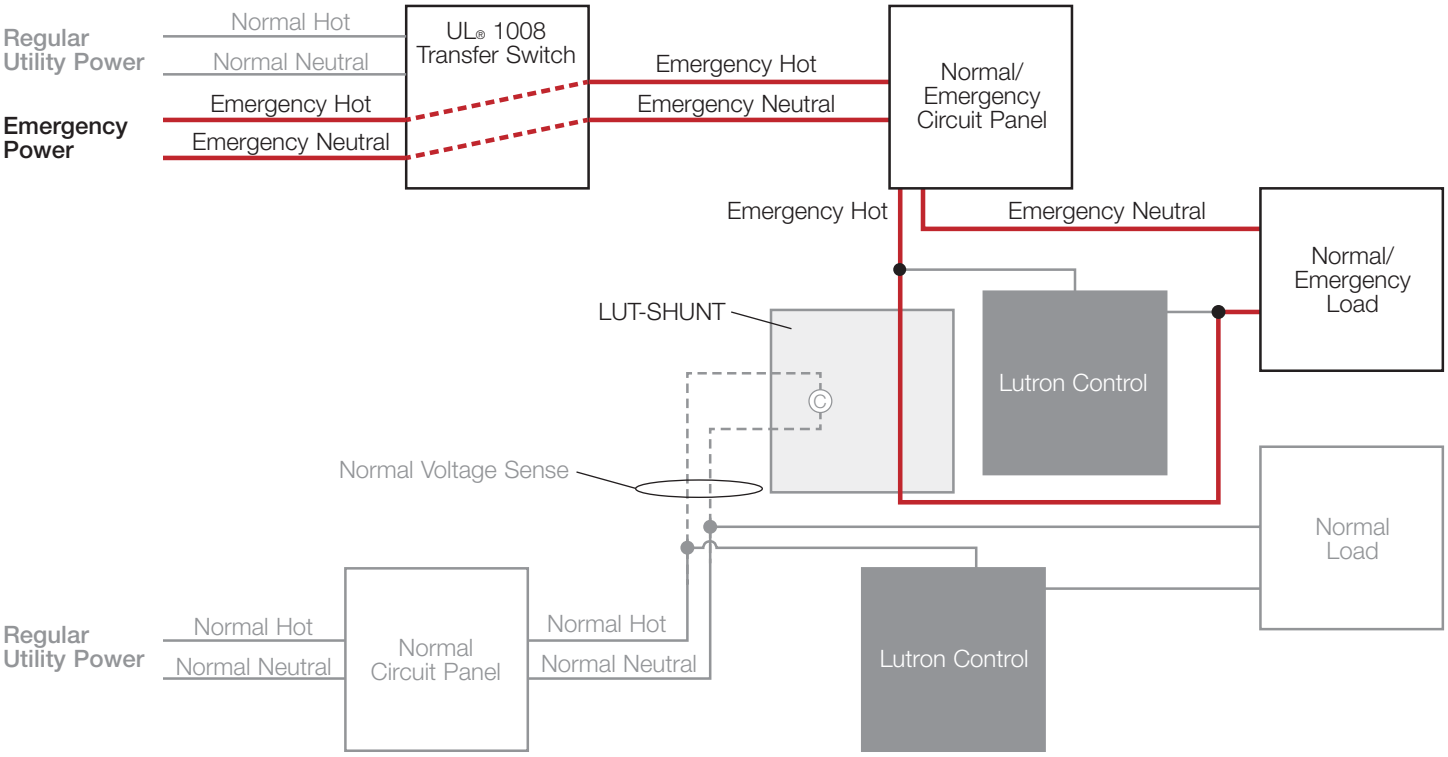
### Powered by a normal/emergency power and controlling an emergency load (continued)

#### Using an ALCR to control normal/emergency fixtures (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage Switching Controls

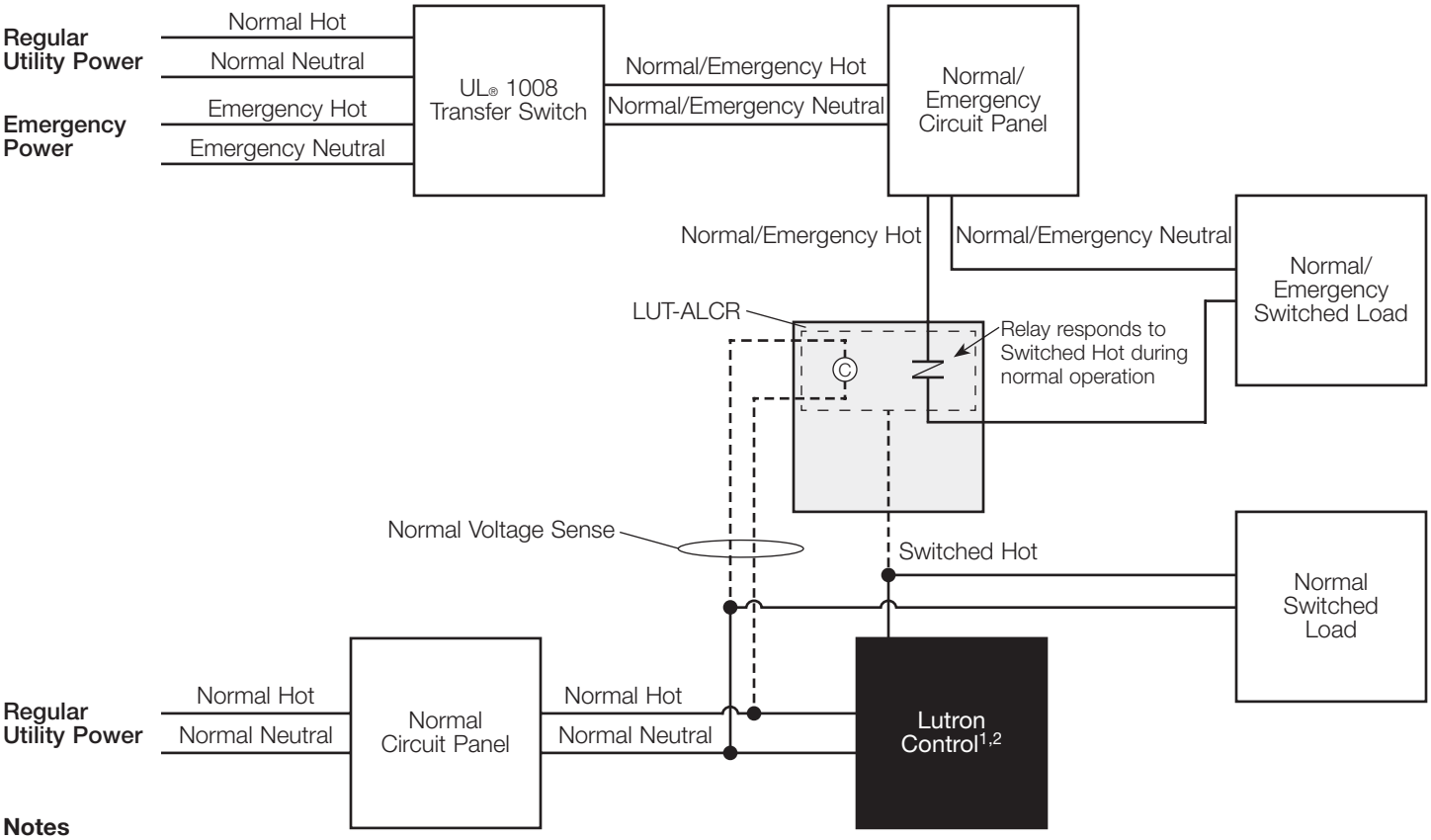
### Powered by a normal power and controlling an emergency load

#### Using an ALCR to control normal/emergency and normal fixtures on the same output

In the application where the switch does not have power during emergency, an ALCR with a normally closed relay that responds to a switched hot signal is used. During regular operation, normal power is sensed along with the switched hot output of the control and the relay responds accordingly. The switched output of the control device does not pass through to the normal/emergency load, it only provides a signal to allow the ALCR to switch a separate normal/emergency power source to the load. During emergency operation, the device senses normal power is lost, the relay closes and no longer responds to the switched output of the switch. An example of an ALCR with a normally closed relay is LUT-ALCR from LVS Controls. These devices can be used with Lutron switching products, which include:

- Wallbox line voltage switches
- Power panels
- PowPak relay module with Softswitch
- PHPM-SW Interface
- Energi Savr Node with Softswitch
- EcoSystem Softswitch module (C5-XPJ-16A)

**Wiring Schematic**




**Notes**

1 Some Lutron products have multiple switched outputs (e.g., Energi Savr Node with Softswitch, power panels). Each output that controls emergency lighting requires its own automatic load control relay.

2 Not all Lutron products require a neutral connection.

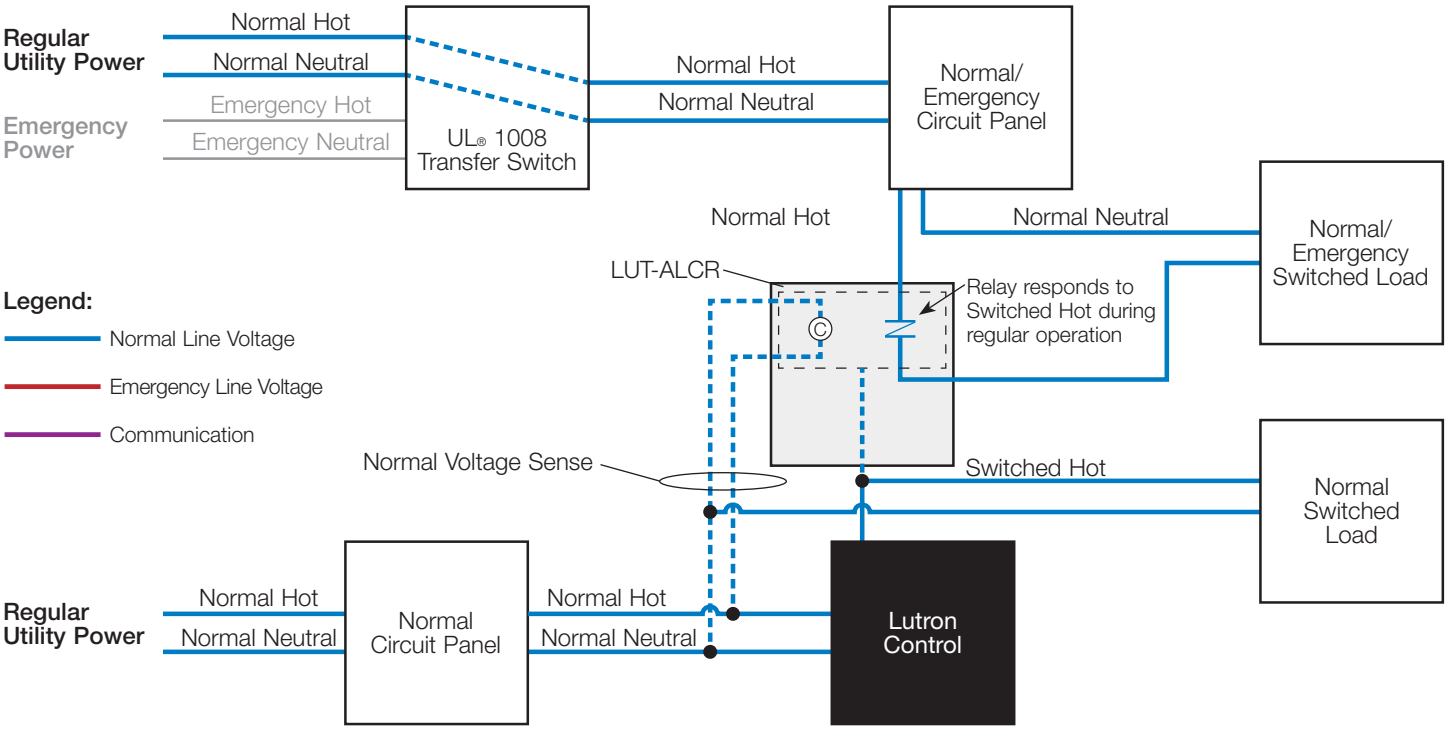
# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage Switching Controls (continued)

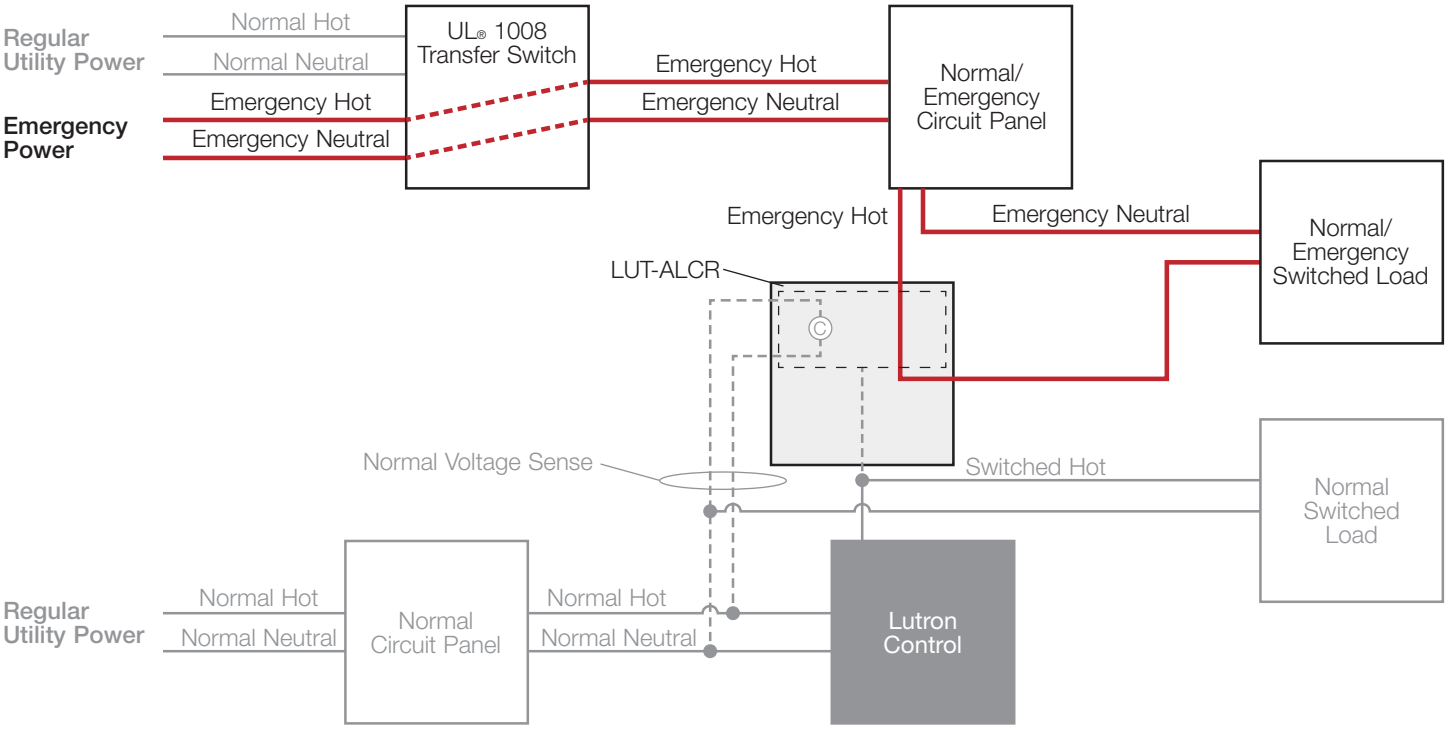
### Powered by a normal power and controlling an emergency load (continued)

#### Using an ALCR to control normal/emergency and normal fixtures on the same output (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage Dimmers

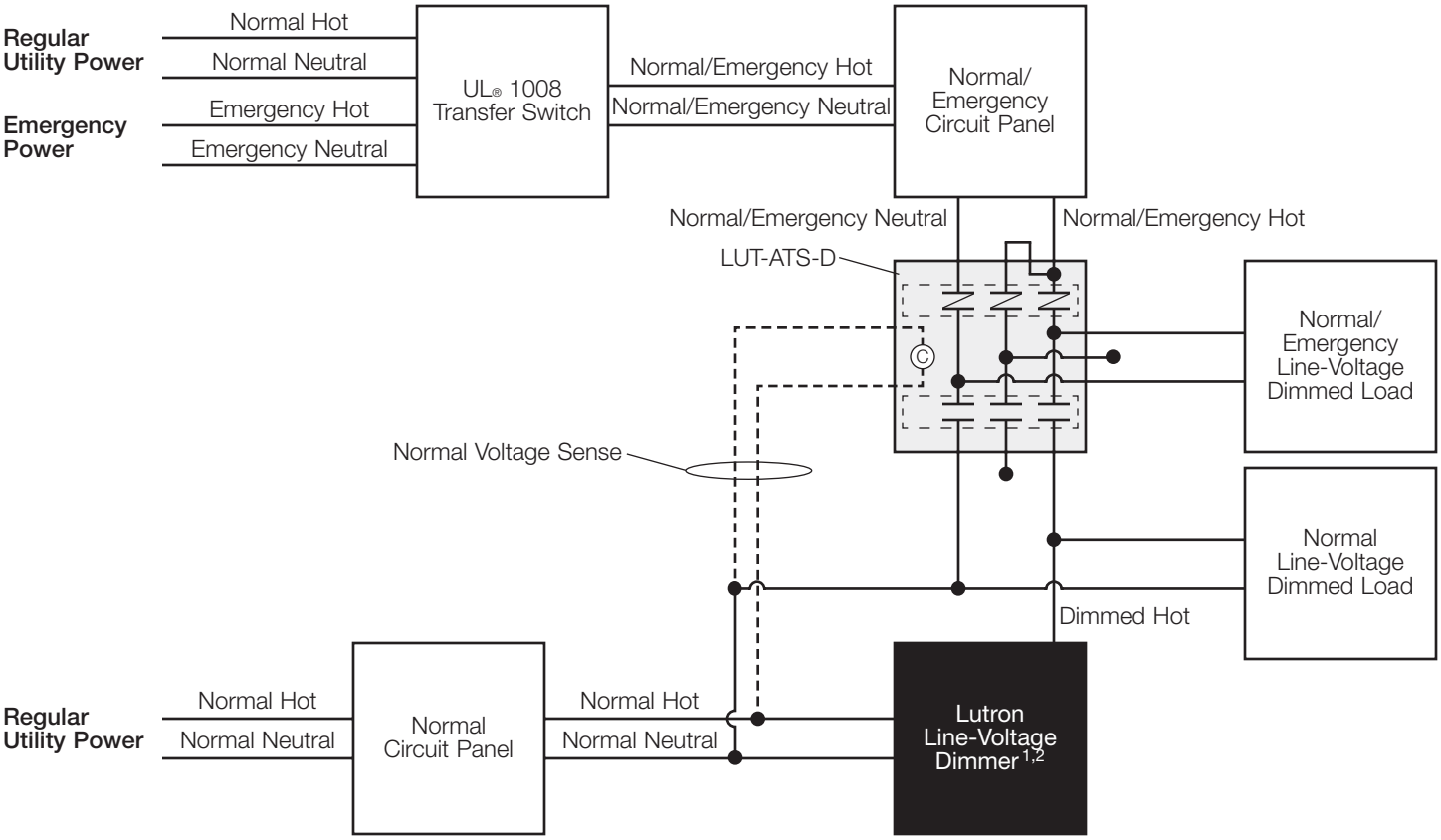
### Powered by normal power and is controlling an emergency load (recommended for products capable of reverse-phase dimming)

**Using an ALCR to control normal/emergency fixtures on one output and normal fixtures on a different output**

In the application where the control is powered by normal power and is controlling an emergency load, an ALCR with multiple normally open and multiple normally closed relays is used. During regular operation, the dimmer controls the load directly. During emergency operation, the device senses normal power is lost and transfers from the dimmer control to emergency power, sending the load to high-end. This device is commonly called a load-side transfer switch. An example of a device like this is LUT-ATS-D from LVS Controls. This can be used with Lutron line-voltage dimming products, which include:

- Wallbox dimmers
- GRAFIK Eye QS control unit
- PHPM-PA and PHPM-WBX interfaces
- Lutron dimming power panels
- Energi Savr Node PRO LED+ phase adaptive unit

**Wiring Schematic**




**Notes**

1 Some Lutron products have multiple dimming outputs (e.g., GRAFIK Eye QS, power panels, Energi Savr Node PRO LED+ phase adaptive). Each output that controls emergency lighting requires its own load-side transfer device.

2 Not all Lutron products require a neutral connection.

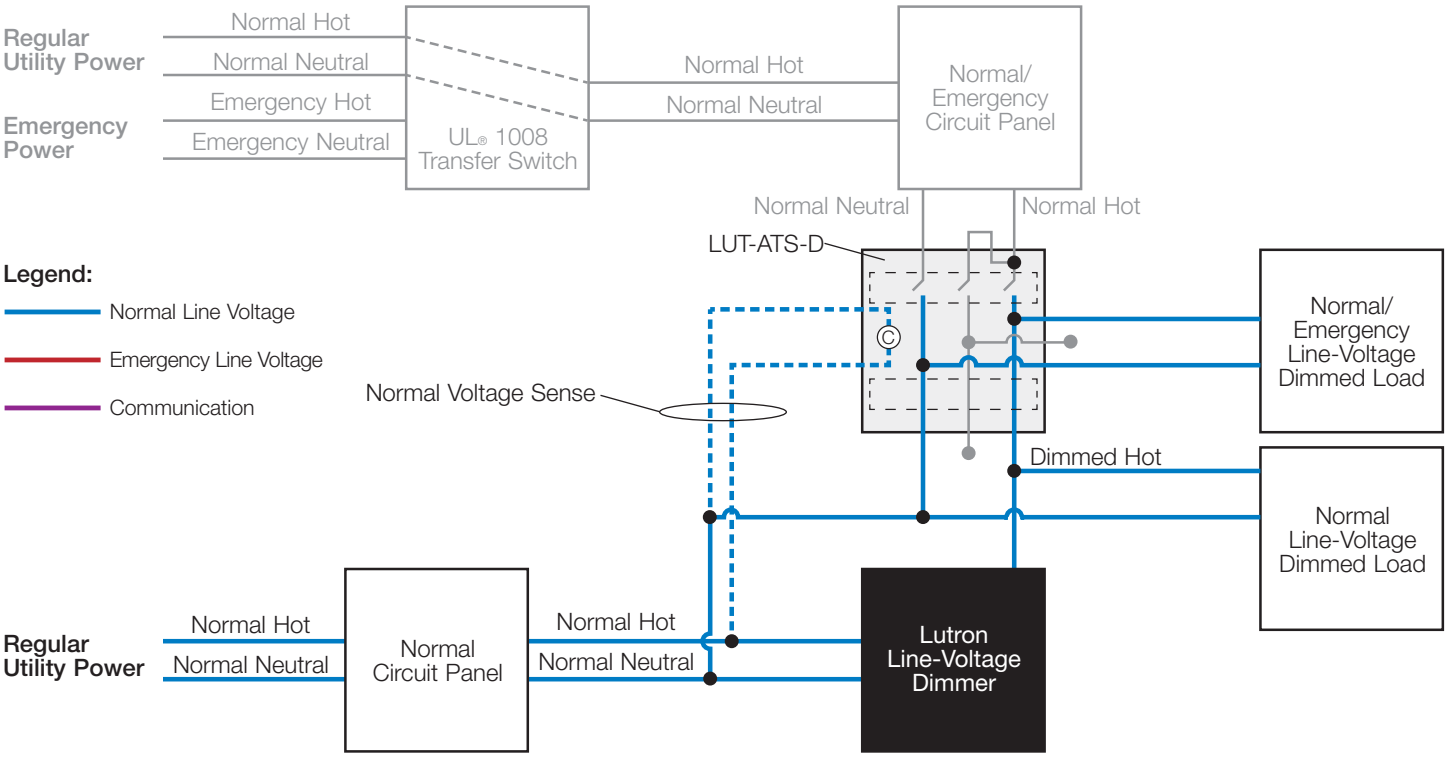
# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage Dimmers (continued)

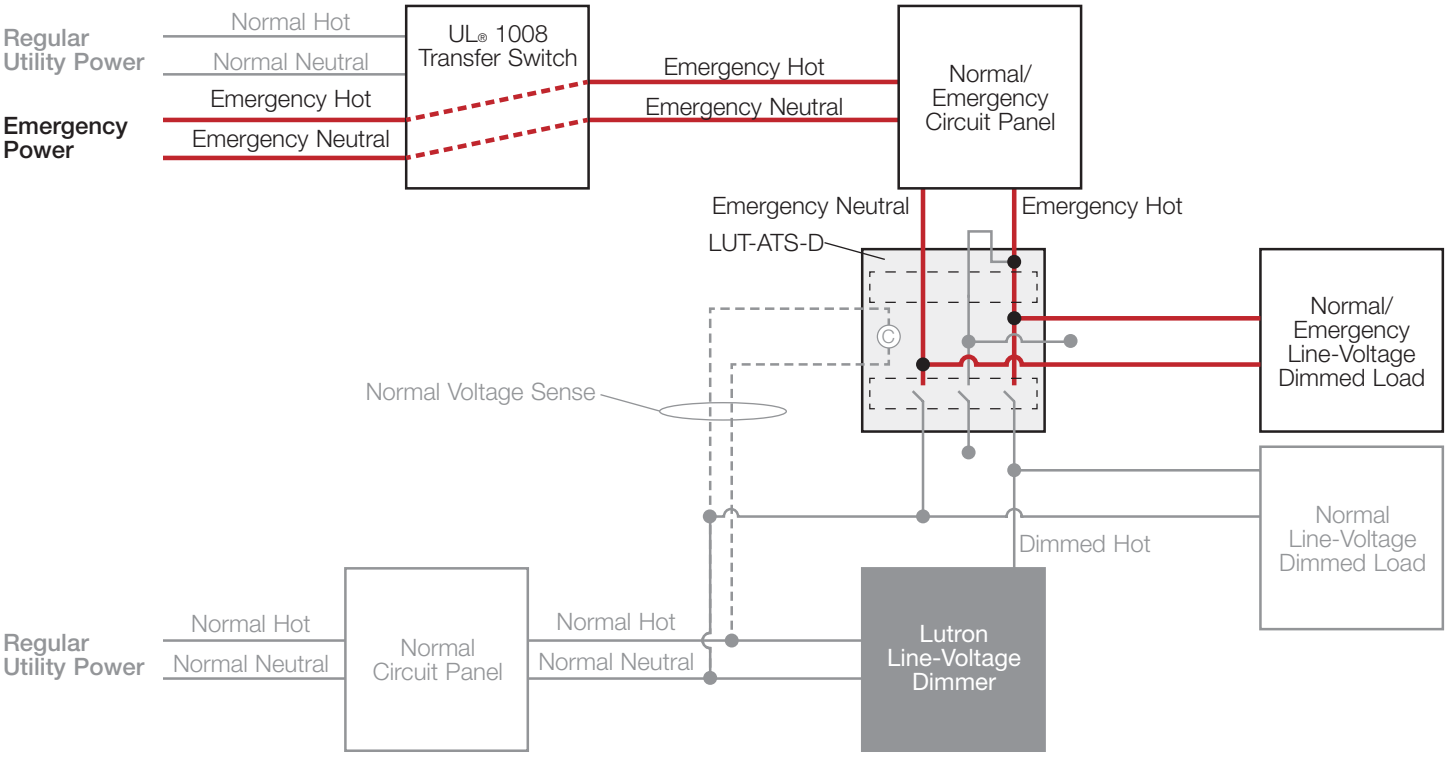
### Powered by normal power and is controlling an emergency load (continued) (recommended for products capable of reverse-phase dimming)

#### Using an ALCR to control normal/emergency fixtures on one output and normal fixtures on a different output (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## 3-Wire Dimmers

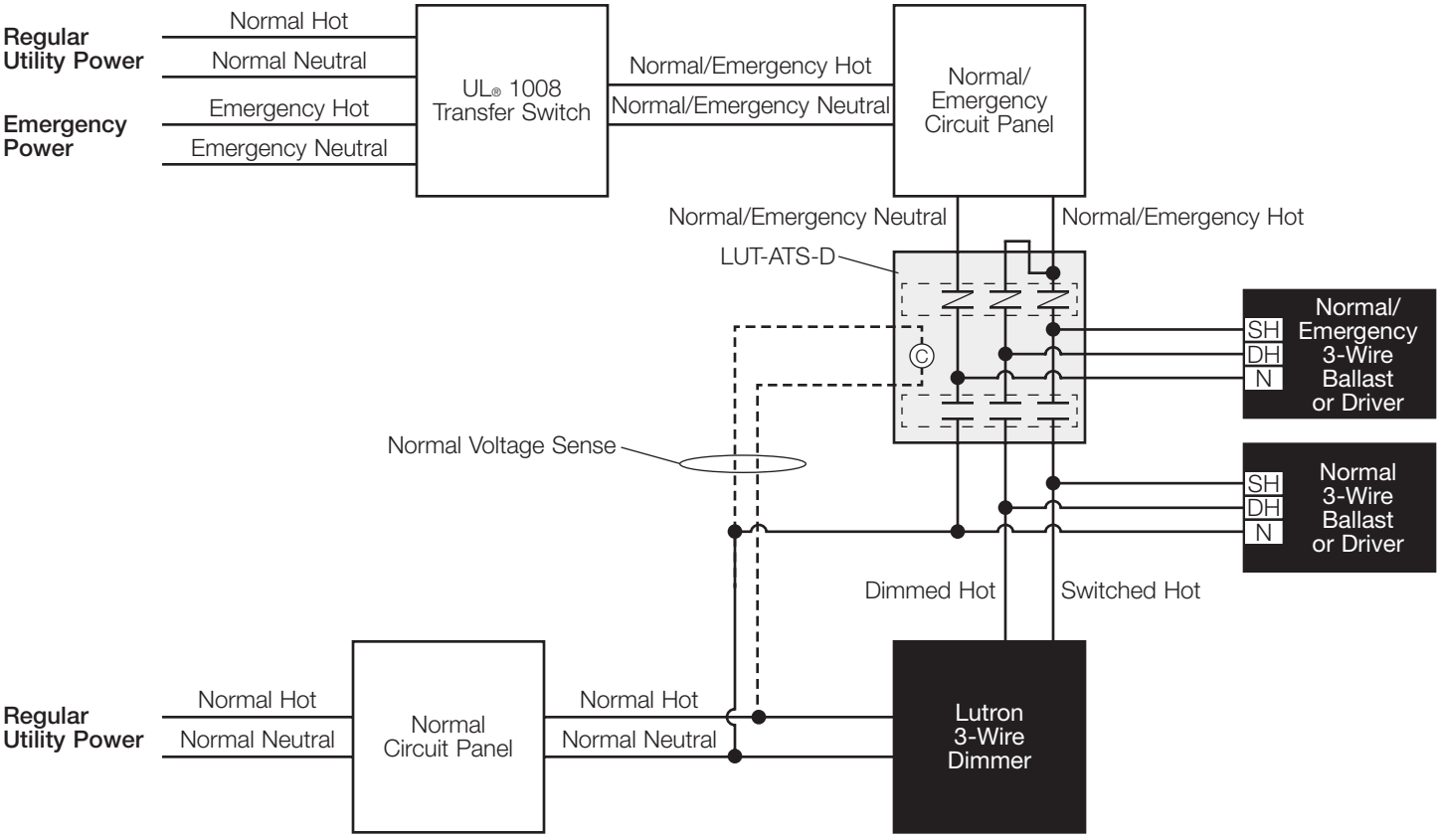
### Powered by normal power and is controlling an emergency load

**Using an ALCR to control normal/emergency fixtures on one output and normal fixtures on a different output**

3-wire dimming uses both a dimmed and switched hot output to control the load. In the application where the dimmer is powered by normal power and is controlling an emergency load, an ALCR is used that has multiple normally open relays and multiple normally closed relays. During regular operation the dimmer controls the load directly. During emergency operation, the device senses normal power is lost and switches power to the emergency feed. The load is then powered directly by emergency power. An example of a device like this is LUT-ATS-D from LVS Controls. This can be used with Lutron 3-wire dimming products, which include:

- 3-wire wallbox dimmer
- PHPM-3F interface
- EcoSystem dimming module (C5-BMJ-16A)
- Ballast fixture module (C5-BMF-2A)
- GP power panel

**Wiring Schematic**



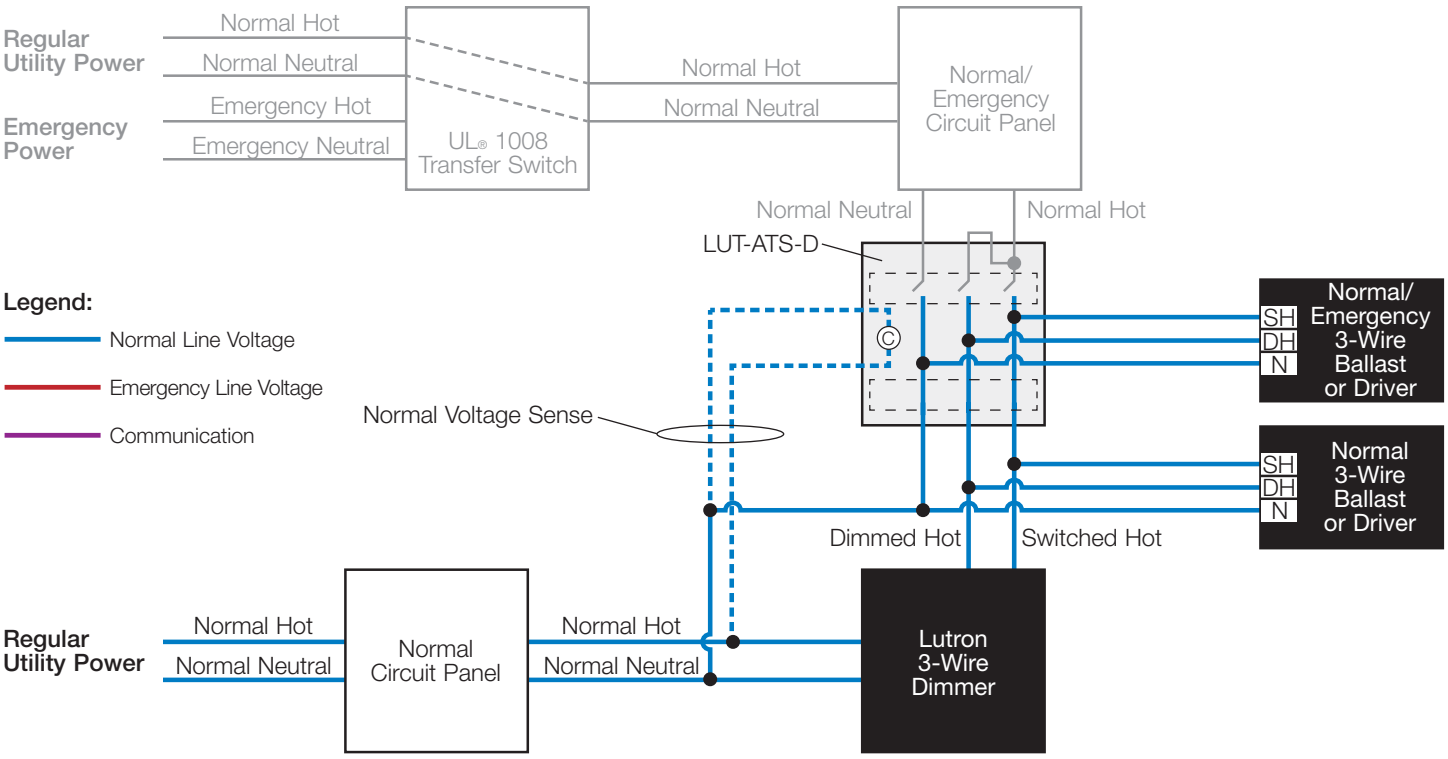
# Applications of Emergency Lighting with Lutron Systems (continued)

## 3-Wire Dimmers (continued)

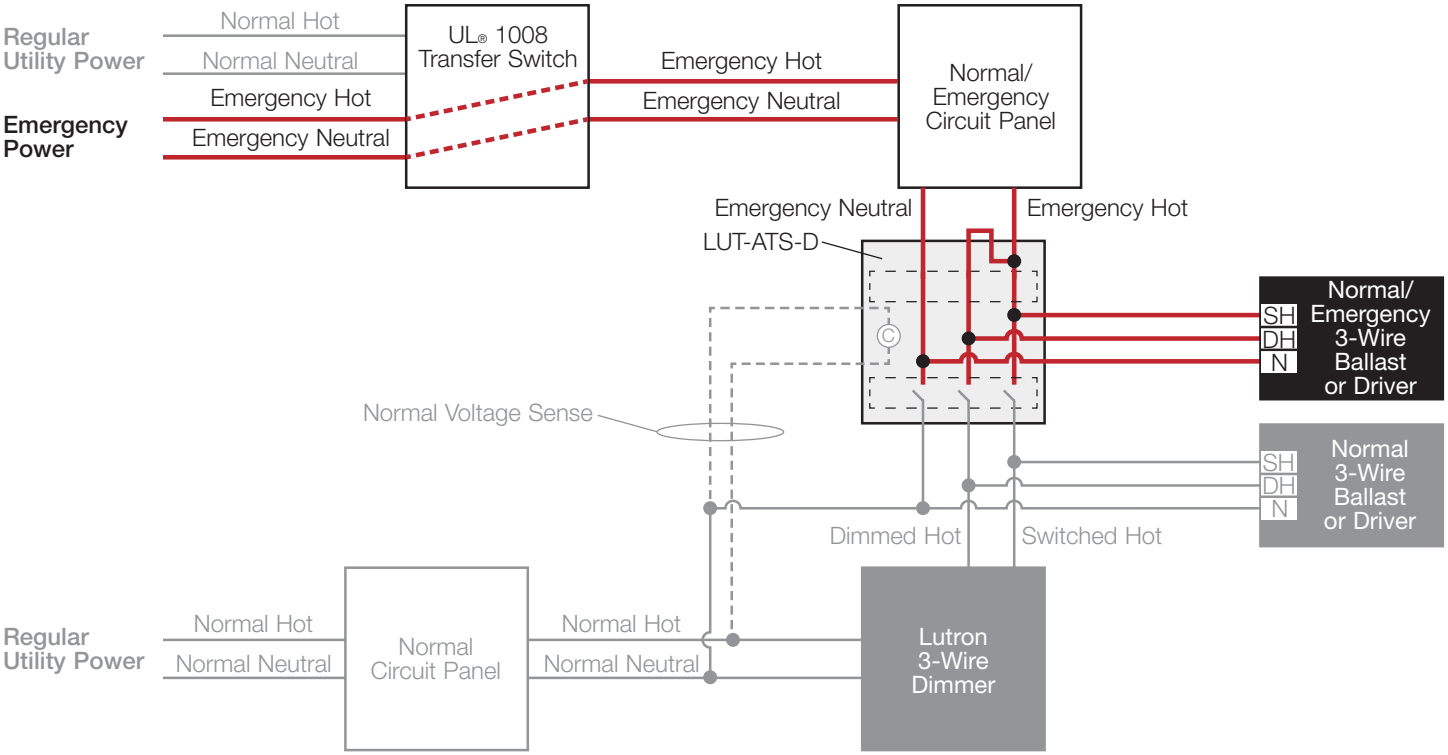
### Powered by normal power and is controlling an emergency load (continued)

**Using an ALCR to control normal/emergency fixtures on one output and normal fixtures on a different output (continued)**

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage 0-10 V⎓ Dimmers

### Powered by normal power and is controlling an emergency load

#### Using an ALCR to control normal/emergency and normal fixtures on the same output

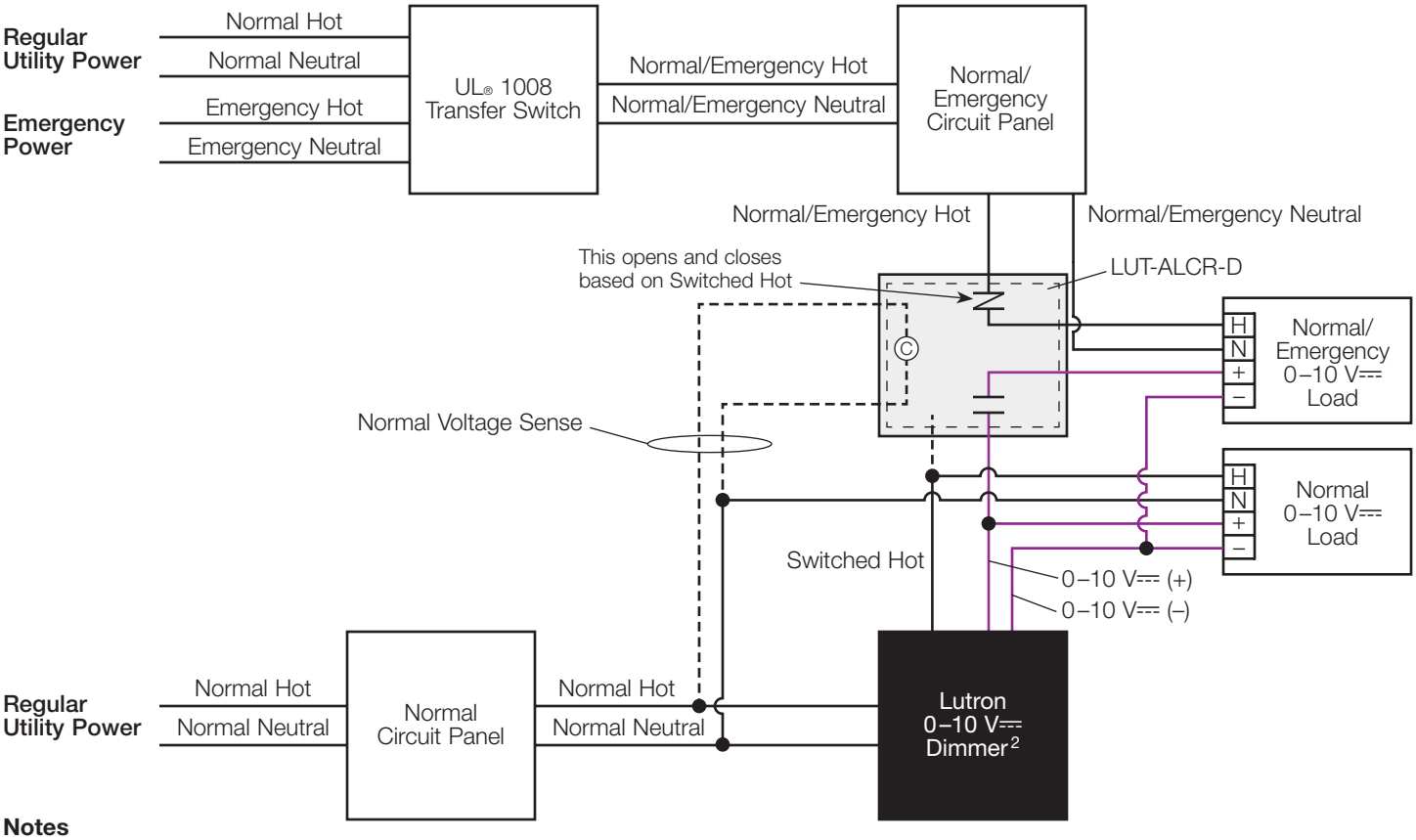
0–10 V⎓ is a dimming technology that uses an analog signal to set a dimmed level and a separate switched output to turn off the load completely. In the application where the dimmer is powered by normal power and is controlling an emergency load, an ALCR is used with a normally open relay and a normally closed relay that responds to a switched hot signal. During regular operation, the normally closed contact responds to the switched hot output of the dimmer, while the normally open contact remains closed. During emergency operation, the device senses that normal power is lost and the normally closed relay closes while the normally open relay opens. Doing this provides power to the load and breaks the 0-10 V signal contact which makes the load go to high-end. The load will go to high-end if the ballast or driver complies with IEC 60929 Annex E. An example of an ALCR that can do this is LUT-ALCR-D from LVS Controls. This type of ALCR can be used with Lutron 0–10 V⎓ controls.

- Line-voltage 0–10 V⎓ wallbox dimmers and dimmer sensors
- EcoSystem 0–10 V⎓ interface (TVI-LMF-2A)
- PowPak dimming module with 0–10 V⎓ control
- PowPak Wireless Fixture Controller with 0–10 V⎓ control[1]
- GRX-TVI interface
- Energi Savr Node 0–10 V⎓
- TVMs with power panels

When using ALCRs with 0–10 V⎓ controls, both the switched output and the 0–10 V⎓ signal must be considered:

- The switched output can be bypassed with a normally closed relay when normal power is lost.
- The 0–10 V⎓ circuit must be set to open when normal power is lost to ensure that the control cannot set a dimmed level on the fixture. This can be accomplished by passing one of the 0–10 V⎓ wires through a normally open relay.

**Wiring Schematic**




**Notes**

1 Wiring this way will not give accurate power measurements.

2 Some Lutron products have multiple dimming outputs (e.g., Energi Savr Node and TVM's with power panels). Each output that controls emergency lighting requires its own load-side transfer device.

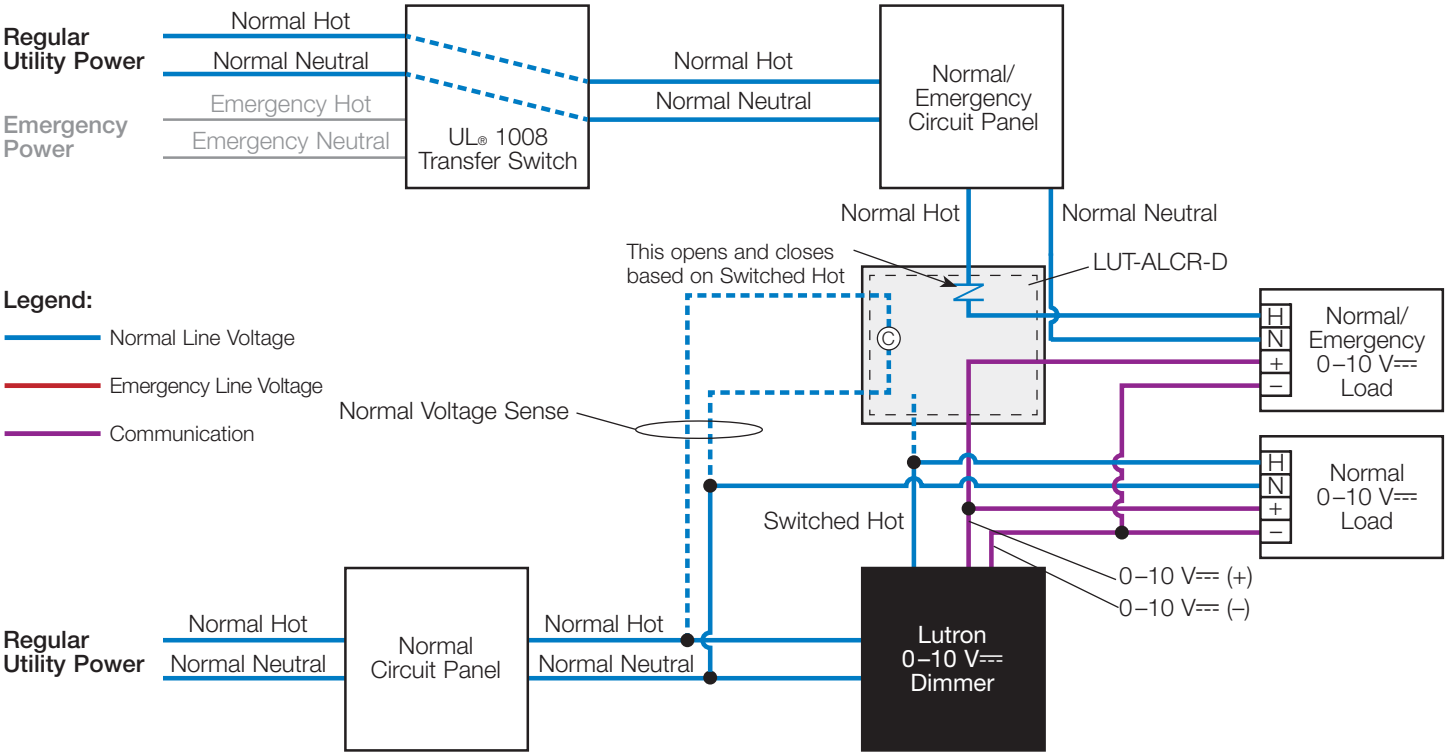
# Applications of Emergency Lighting with Lutron Systems (continued)

## Line-Voltage 0-10 V⎓ Dimmers (continued)

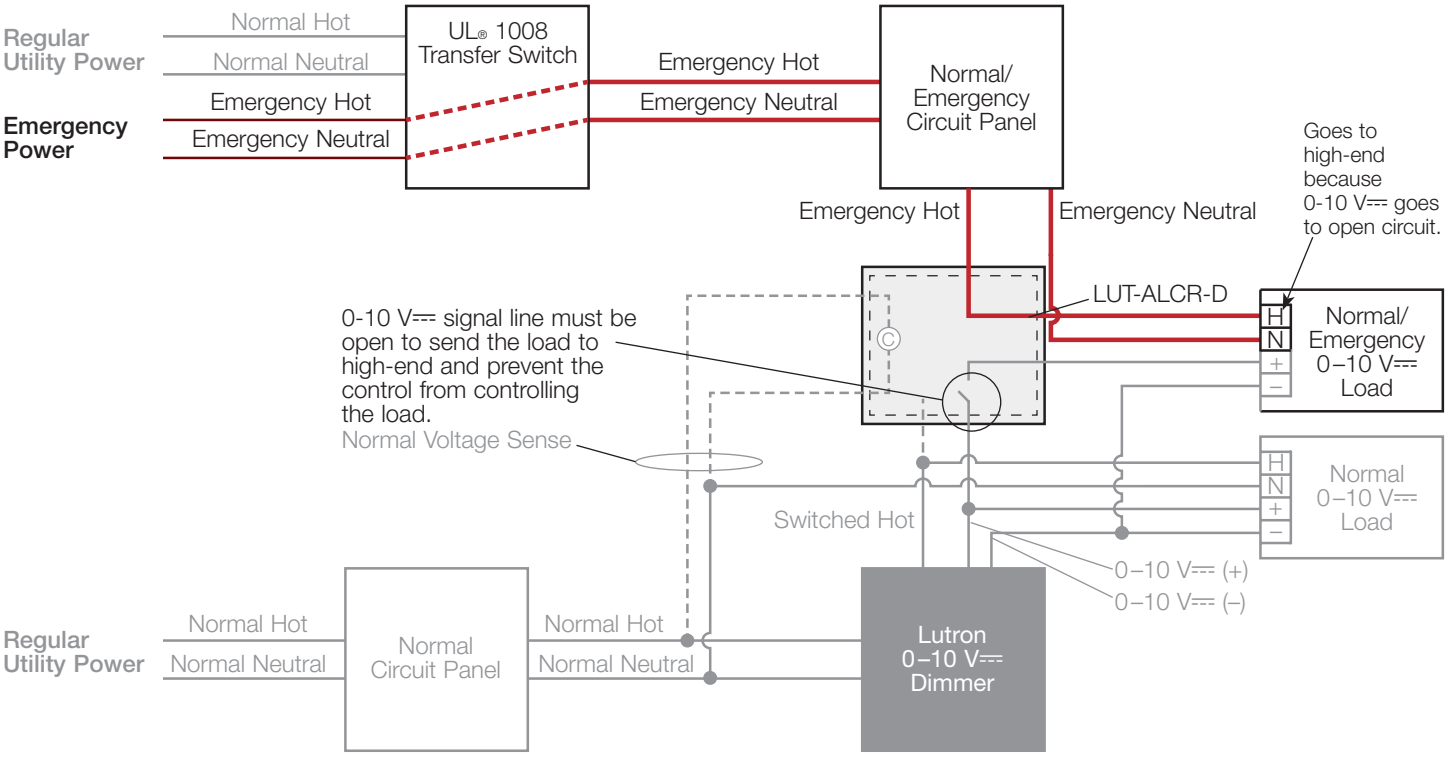
### Powered by normal power and is controlling an emergency load (continued)

### Using an ALCR to control normal/emergency and normal fixtures on the same output (continued)

#### Regular Operation




#### Emergency Operation



# Applications of Emergency Lighting with Lutron Systems (continued)

## Low-Voltage 0-10 V⎓ Dimmers and Power Pack

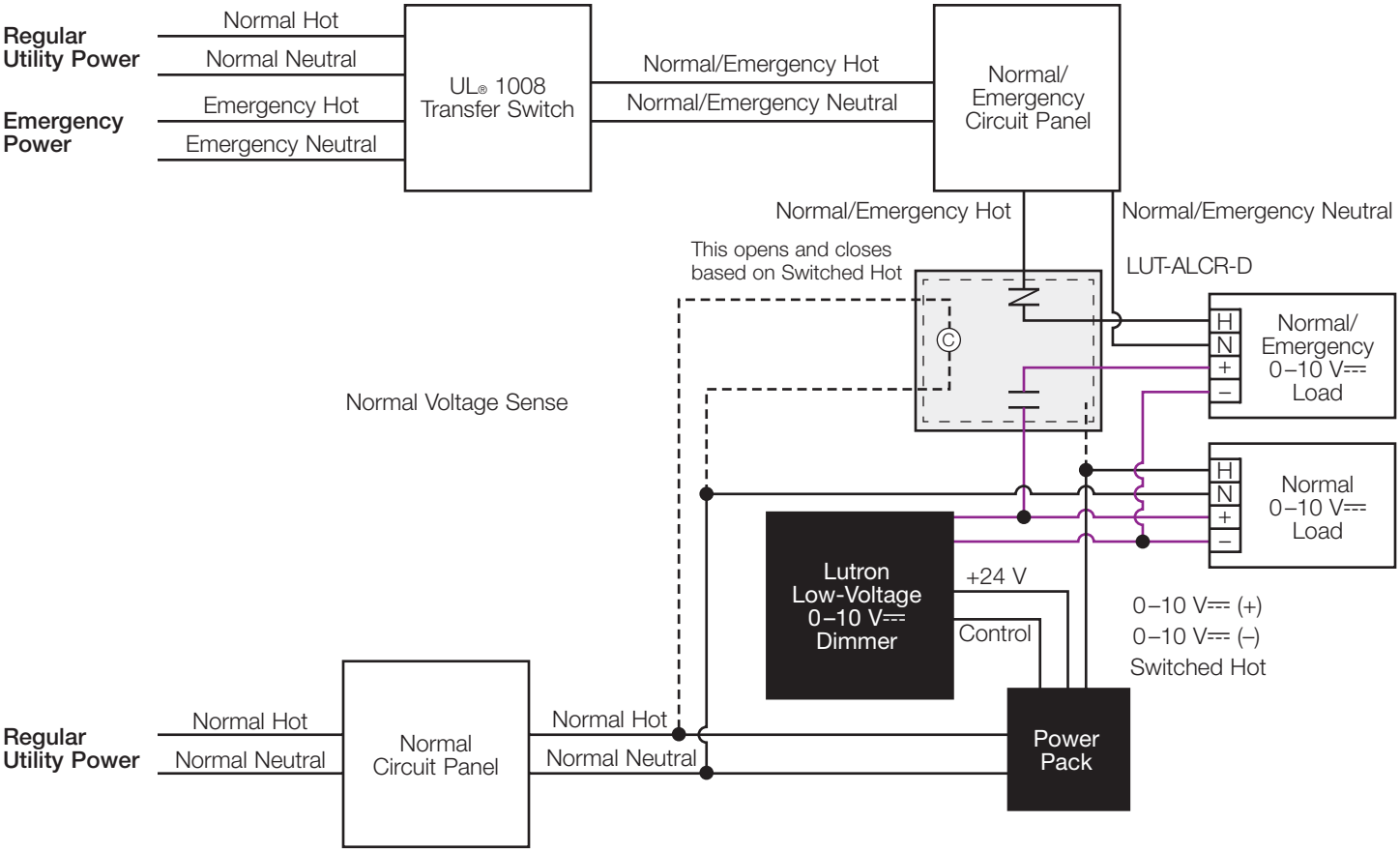
### Powered by normal power and are controlling an emergency load

#### Using an ALCR to control normal/emergency and normal fixtures on the same output

In the application where the low-voltage 0–10 V⎓ dimmer provides a closed or open signal to the power pack and 0-10 V⎓ signal to the load, an ALCR is used with a normally open relay and a normally closed relay that responds to a switched hot signal. During regular operation, the normally closed contact responds to the switched hot output of the dimmer, while the normally open contact remains closed. During emergency operation, the device senses normal power is lost and the normally closed relay closes while the normally open relay opens. Doing this provides power to the load and breaks the 0-10 V⎓ signal which makes the load go to high-end if the ballast or driver complies with IEC 60929 Annex E. An example of this type of ALCR is LUT-ALCR-D from LVS Controls. Lutron 0–10 V⎓ dimmers include:

- Diva 0–10 V⎓ (DVTV-)
- Nova T 0–10 V⎓ (NFTV-)
- Nova T☆ 0–10 V⎓ (NTSTV-)

**Wiring Schematic**



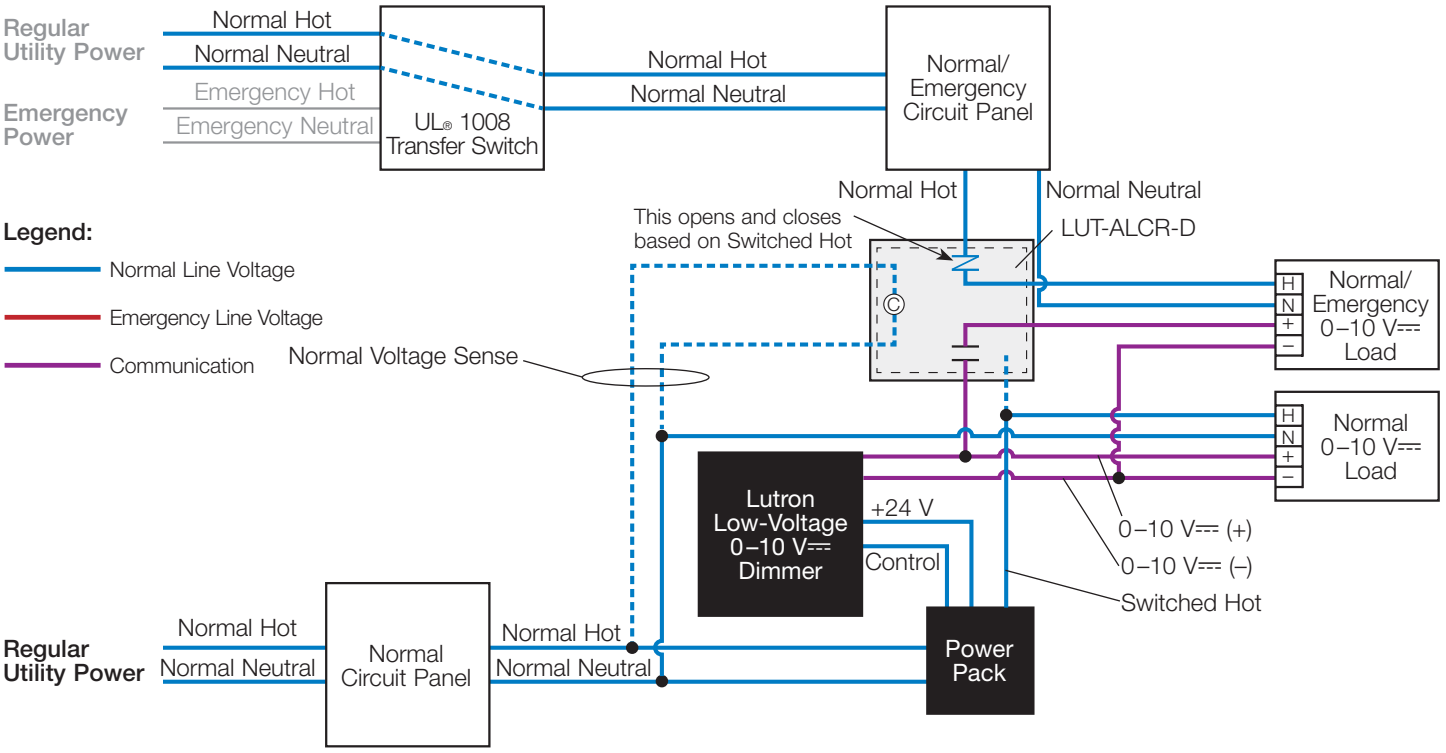
# Applications of Emergency Lighting with Lutron Systems (continued)

## Low-Voltage 0-10 V⎓ Dimmers and Power Pack (continued)

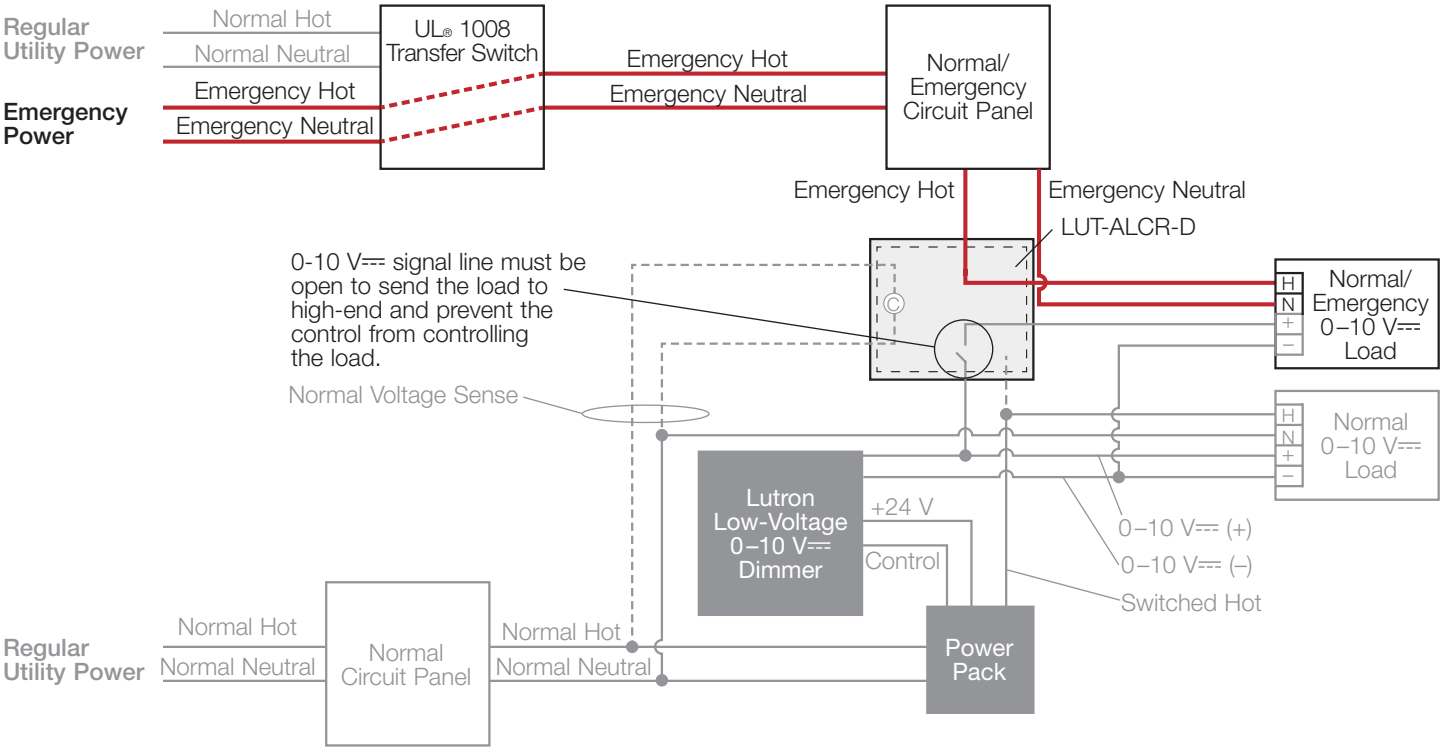
### Powered by normal power and are controlling an emergency load (continued)

### Using an ALCR to control normal/emergency and normal fixtures on the same output (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

### GRAFIK Eye QS Control Unit with Phase Control

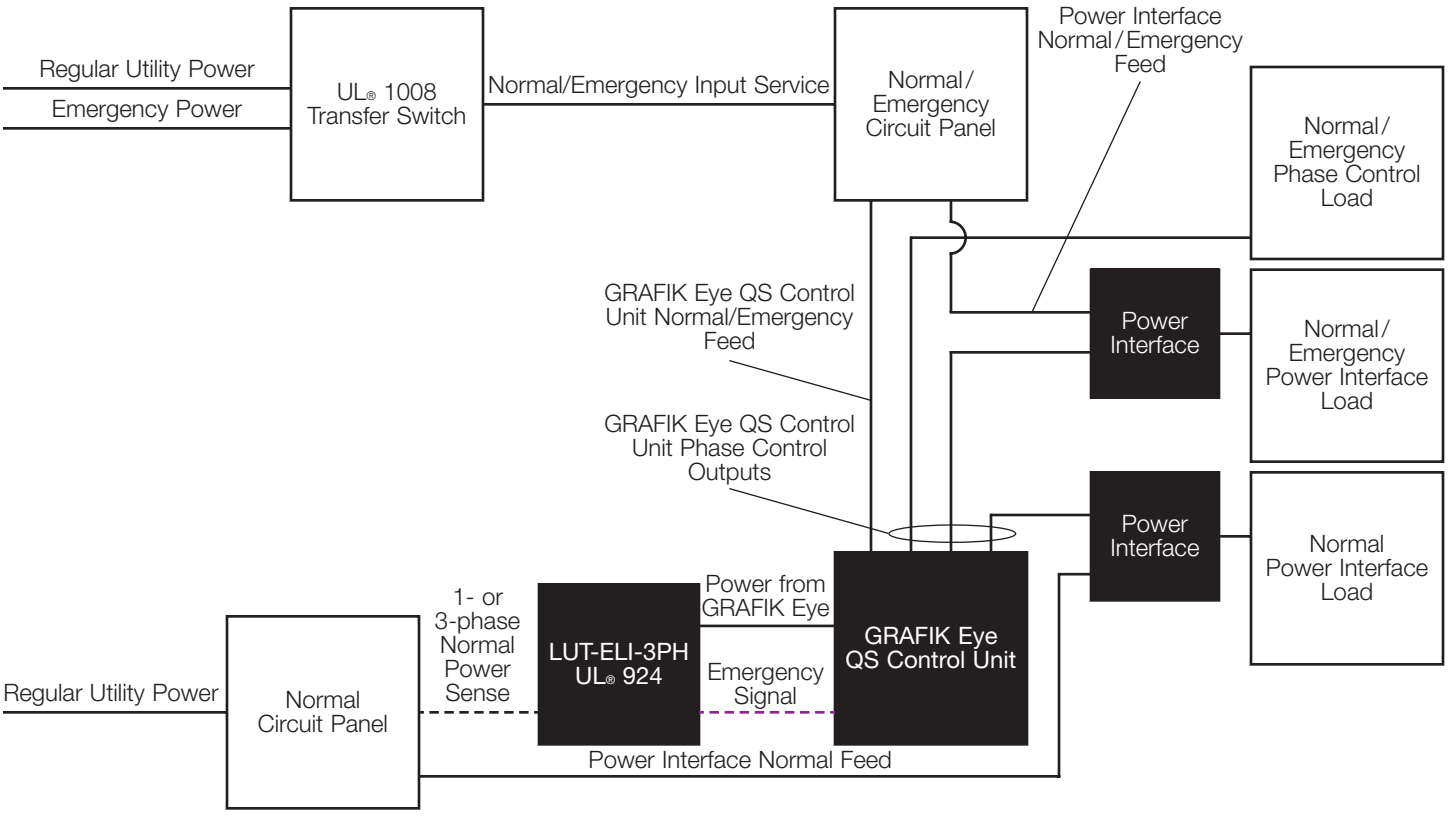
#### Powered by normal/emergency power and controlling an emergency load

**Using the LUT-ELI for UL® 924 applications with power interfaces**

The LUT-ELI is listed under UL® 924 and, when used in a lighting system with a GRAFIK Eye QS phase control or EcoSystem unit, equips the entire emergency lighting system to also meet UL® 924 standards. The LUT-ELI interfaces with the GRAFIK Eye QS control unit through the contact closure input on the back of the GRAFIK Eye QS control unit. When the LUT-ELI senses that any phase of normal power is lost, it sends all loads connected to the GRAFIK Eye QS control unit to 100% after which the GRAFIK Eye QS control unit will lock itself out from any control. When using this application, remember these key points:

- The GRAFIK Eye QS control unit must be powered by normal/emergency power.
- The input on the back of the GRAFIK Eye QS control unit must be programmed as an emergency input.
- If EcoSystem devices are part of the emergency lighting, they must be powered by normal/emergency power.
- If using a power interface that controls emergency lighting, that interface must be powered by normal/emergency power.

Please refer to the LUT-ELI and GRAFIK Eye QS control unit installation instructions for full wiring and programming instructions for this application.



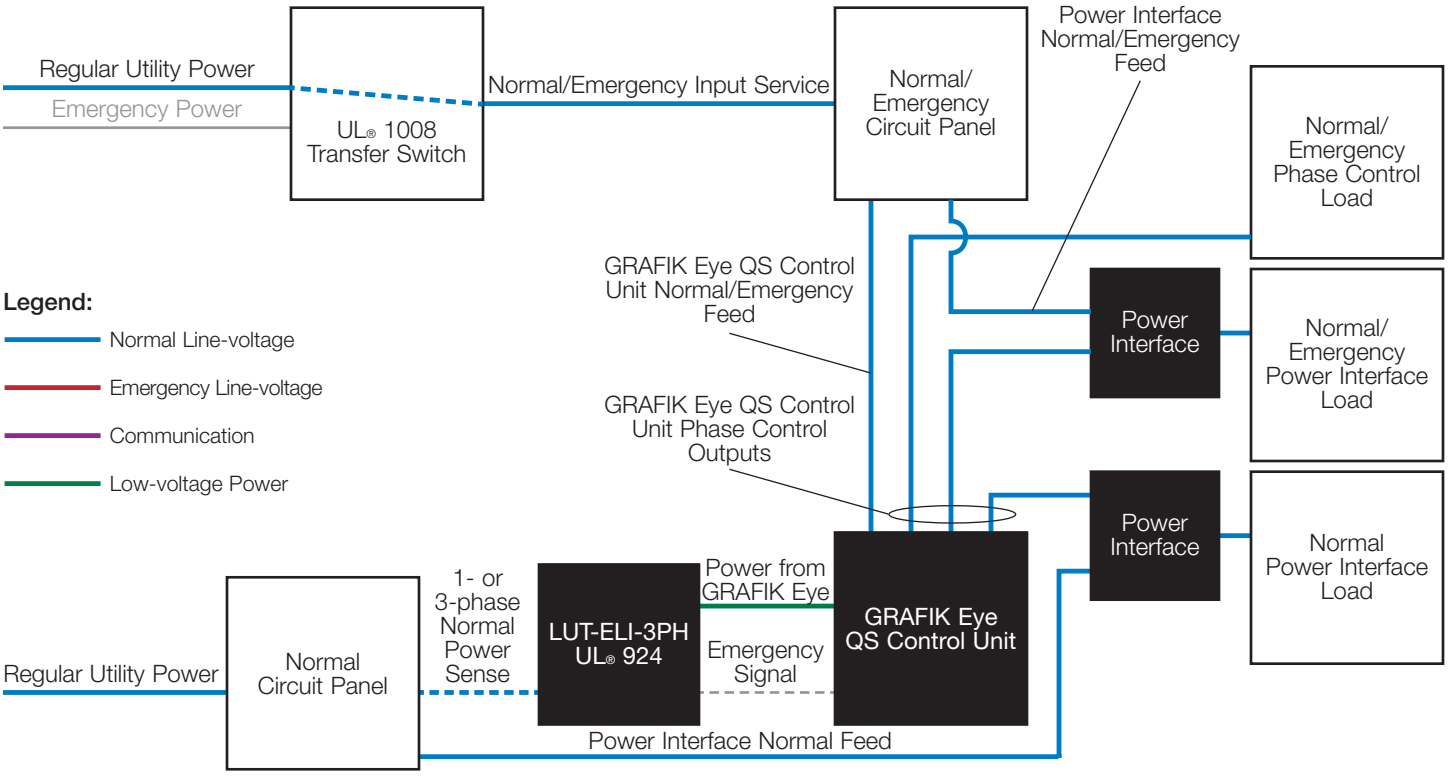
# Applications of Emergency Lighting with Lutron Systems (continued)

## GRAFIK Eye QS Control Unit with Phase Control (continued)

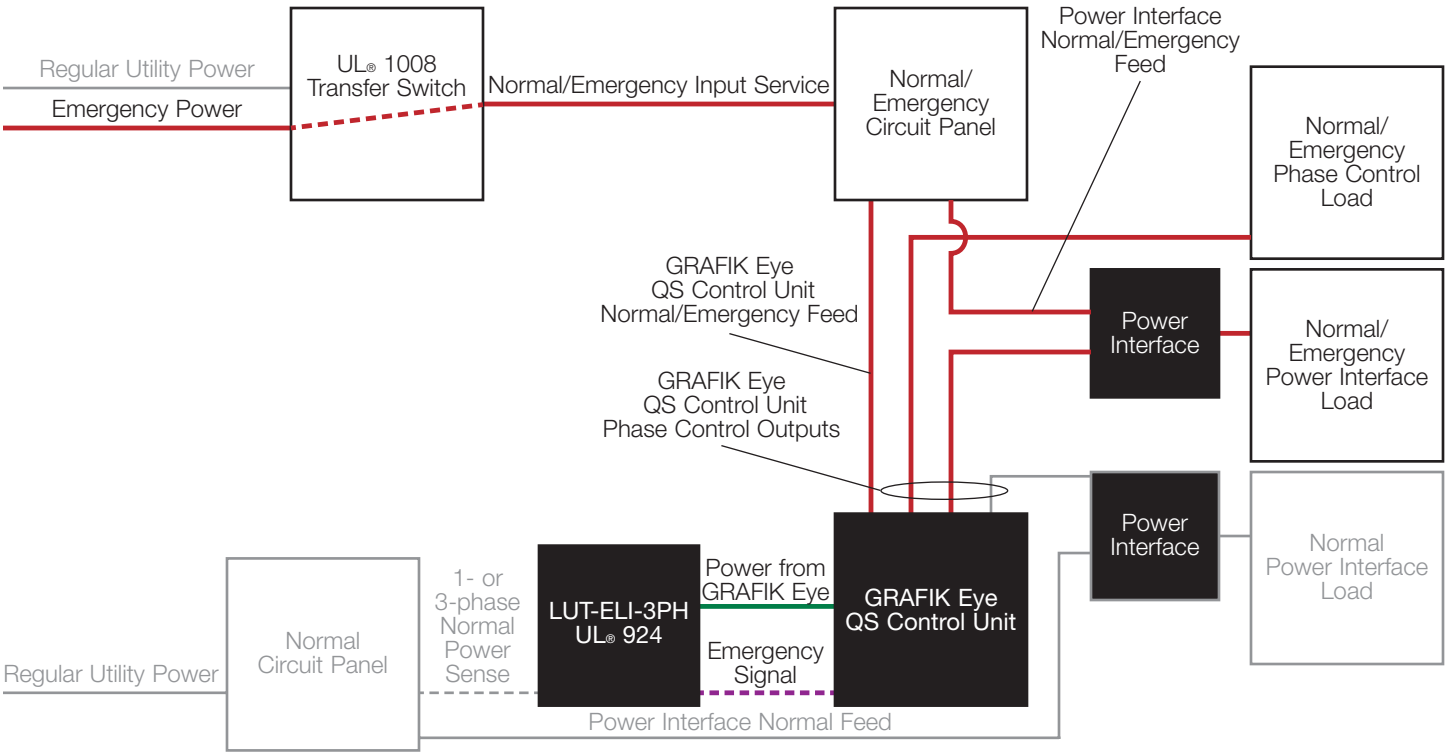
### Powered by normal/emergency power and controlling an emergency load (continued)

### Using the LUT-ELI for UL® 924 applications with power interfaces (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

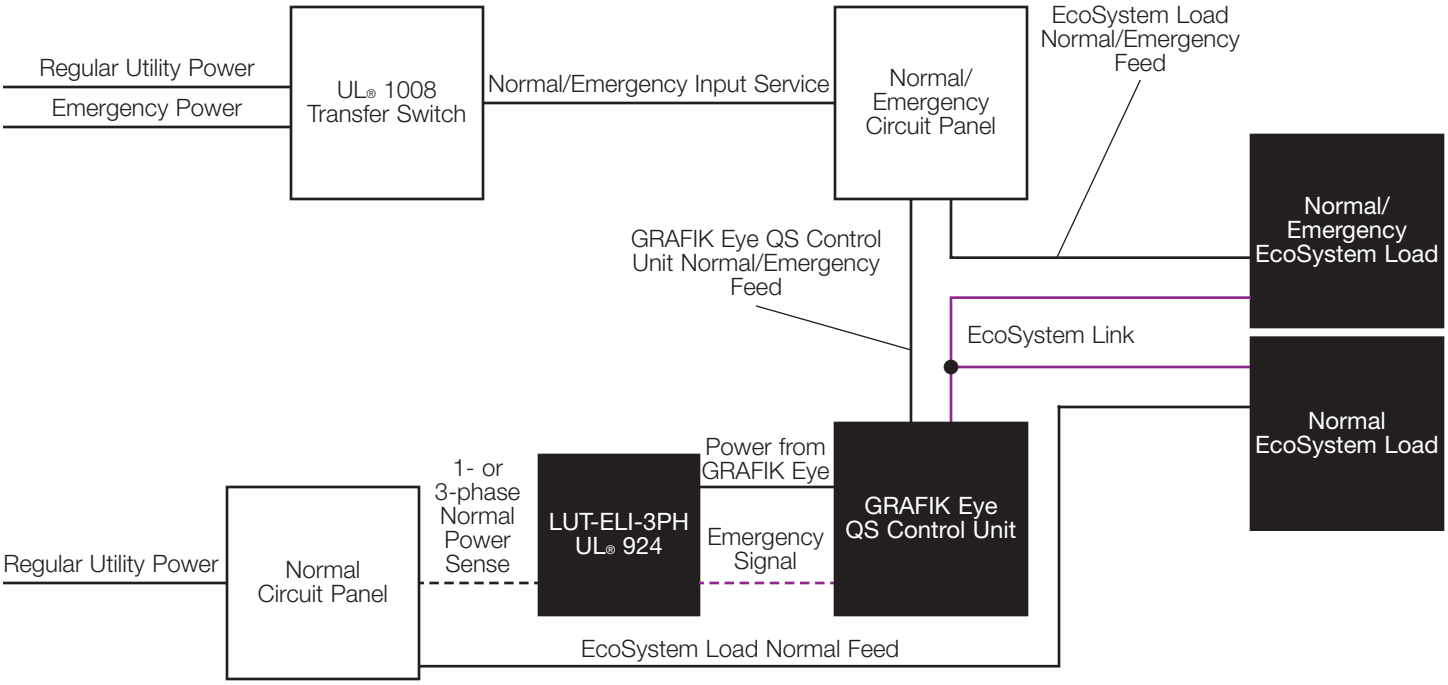
### GRAFIK Eye QS Control Unit with EcoSystem

#### Powered by normal/emergency power and controlling an emergency load

#### Using the LUT-ELI for UL® 924 applications with EcoSystem loads

In the application where the GRAFIK Eye® QS with EcoSystem is being used with a LUT-ELI, no ALCR is required. The GRAFIK Eye is powered by normal/emergency power and the GRAFIK Eye powers the LUT-ELI. The LUT-ELI senses normal power and when normal power is lost, the LUT-ELI sends a signal to the GRAFIK Eye, which sends all the loads to their high-end level and locks the unit. In this system the load gets driven to high-end because the GRAFIK Eye is powered and commanding it to the level not because of a break in the EcoSystem link from the ALCR or a loss of power to the EcoSystem bus supply.

**Wiring Schematic**



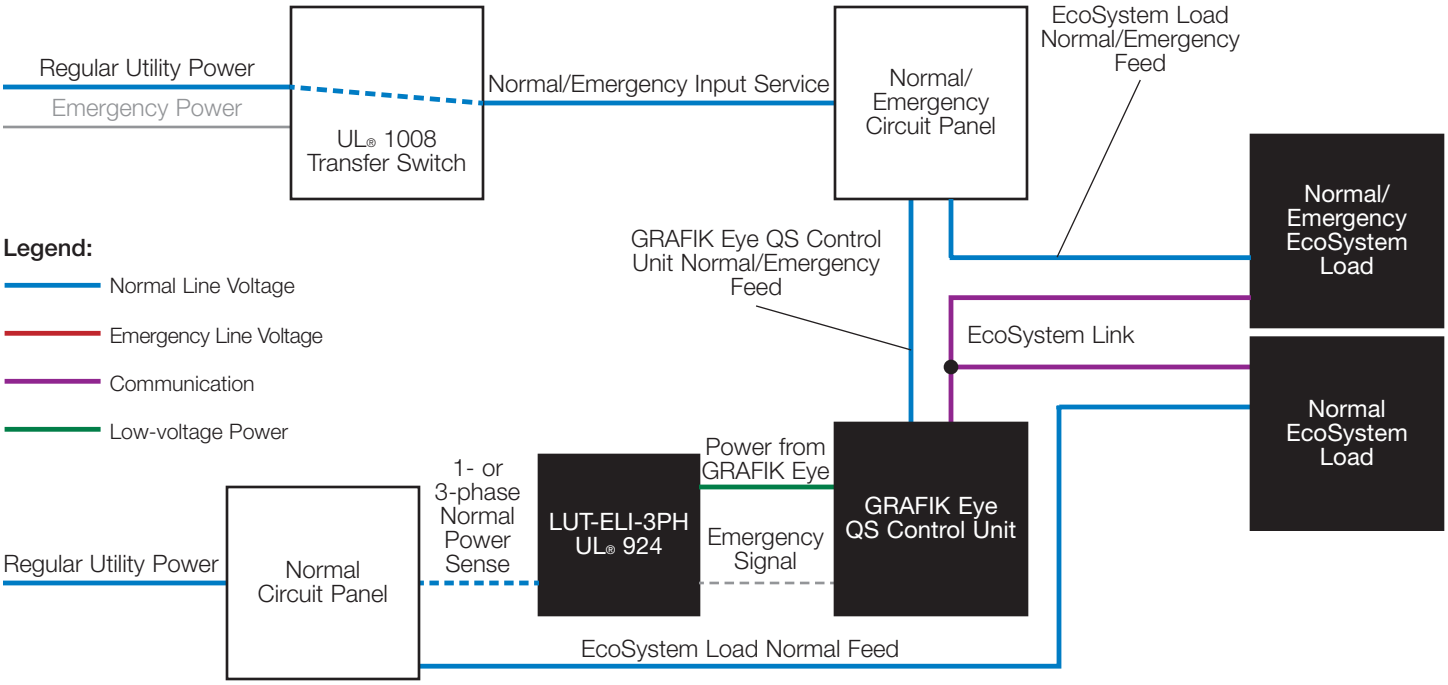
# Applications of Emergency Lighting with Lutron Systems (continued)

## GRAFIK Eye QS Control Unit with EcoSystem (continued)

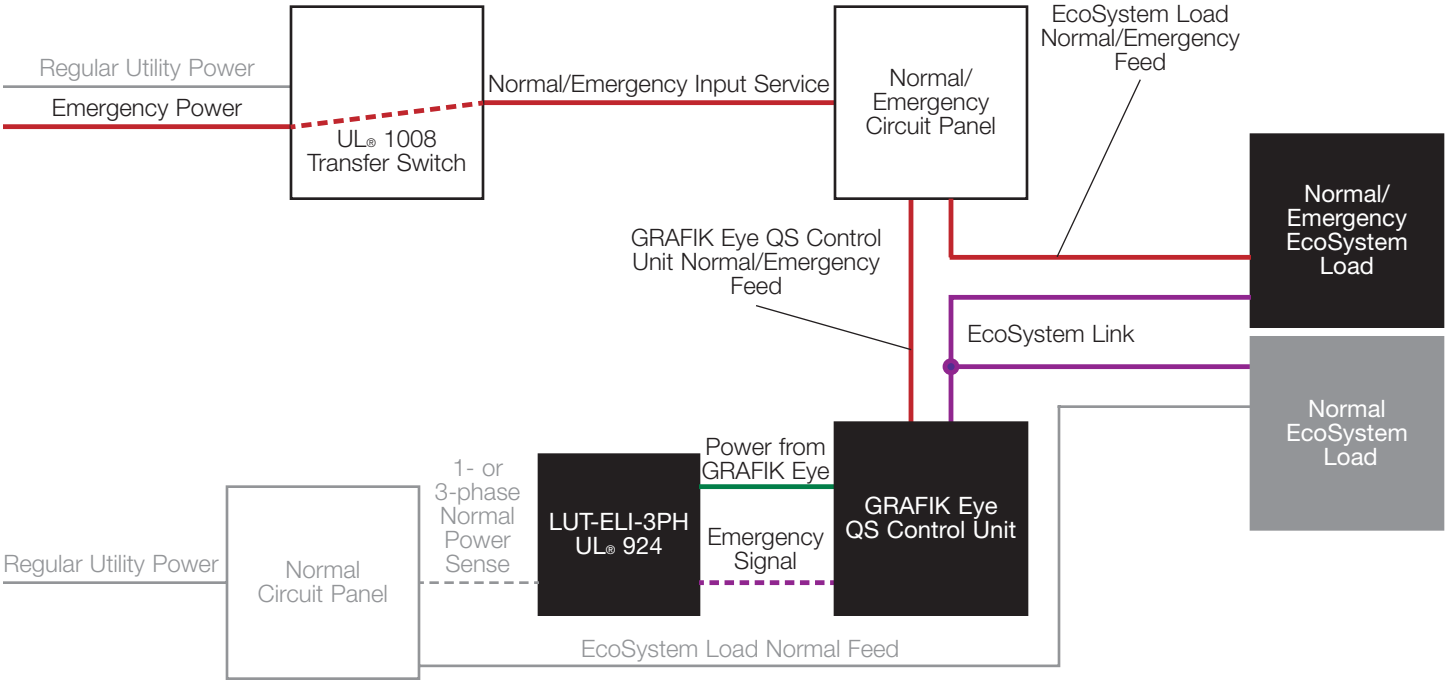
### Powered by normal/emergency power and controlling an emergency load (continued)

### Using the LUT-ELI for UL® 924 applications with EcoSystem loads (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

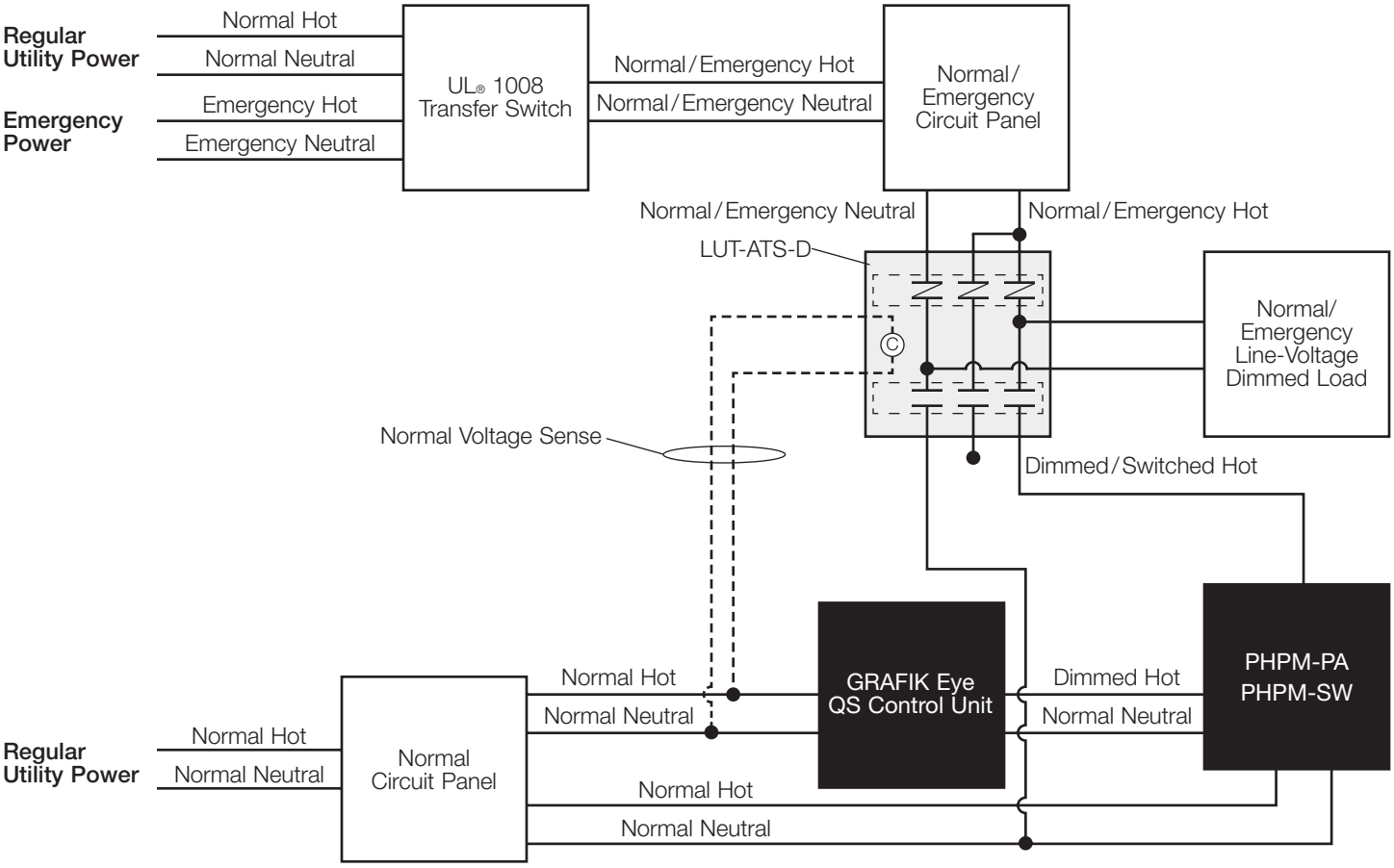
## GRAFIK Eye QS Control Unit with PHPM-PA and/or PHPM-SW Interfaces

### Powered by normal power and controlling an emergency load

#### Using an ALCR with PHPM-PA and/or PHPM-SW interfaces

In the application where the GRAFIK Eye and load interface are on normal power and controlling an emergency load, an ALCR with multiple normally closed and multiple normally open relays is used. During regular operation the PHPM controls the load directly. During emergency operation, the load is powered directly by emergency power. An example of this type of ALCR is LUT-ATS-D from LVS Controls.

**Wiring Schematic**



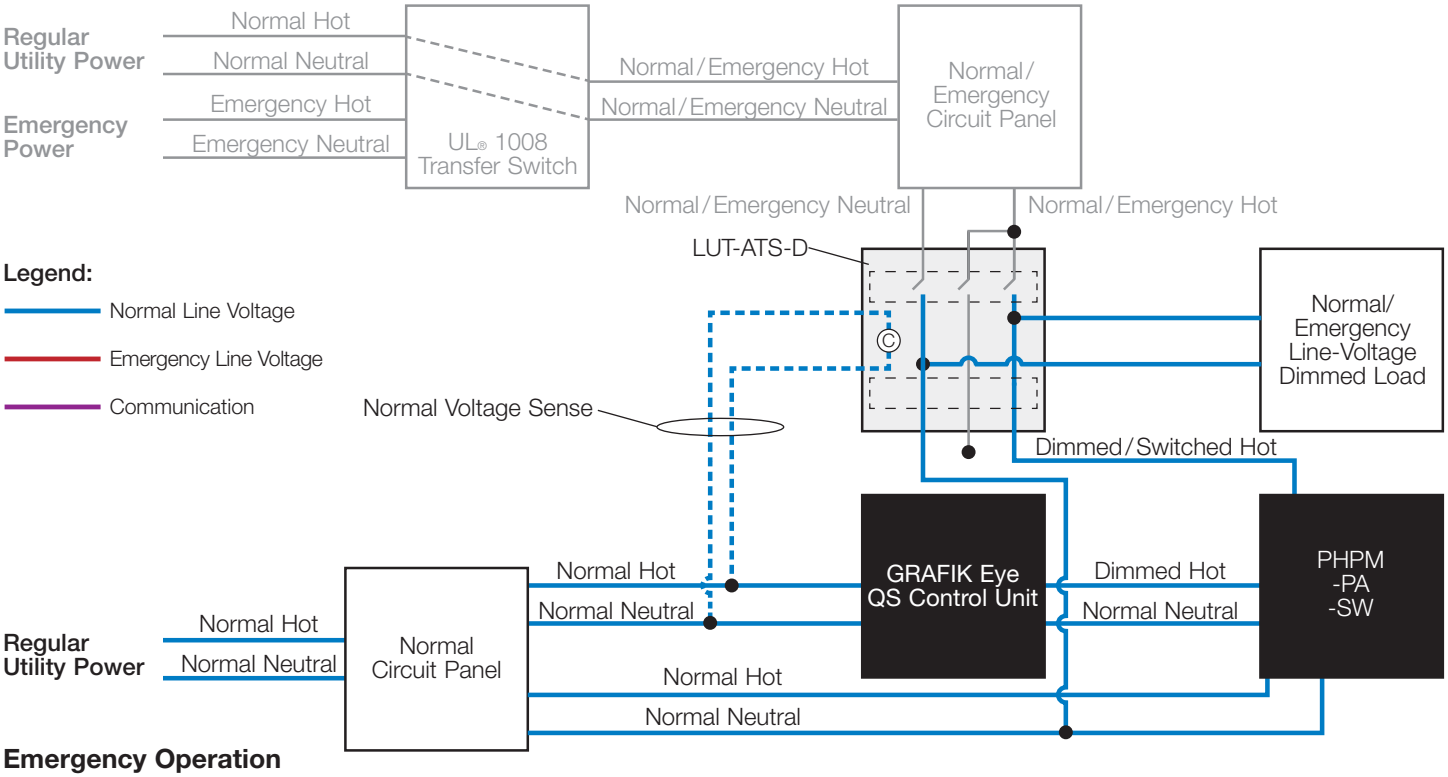
# Applications of Emergency Lighting with Lutron Systems (continued)

## GRAFIK Eye QS Control Unit with PHPM-PA and/or PHPM-SW Interfaces (continued)

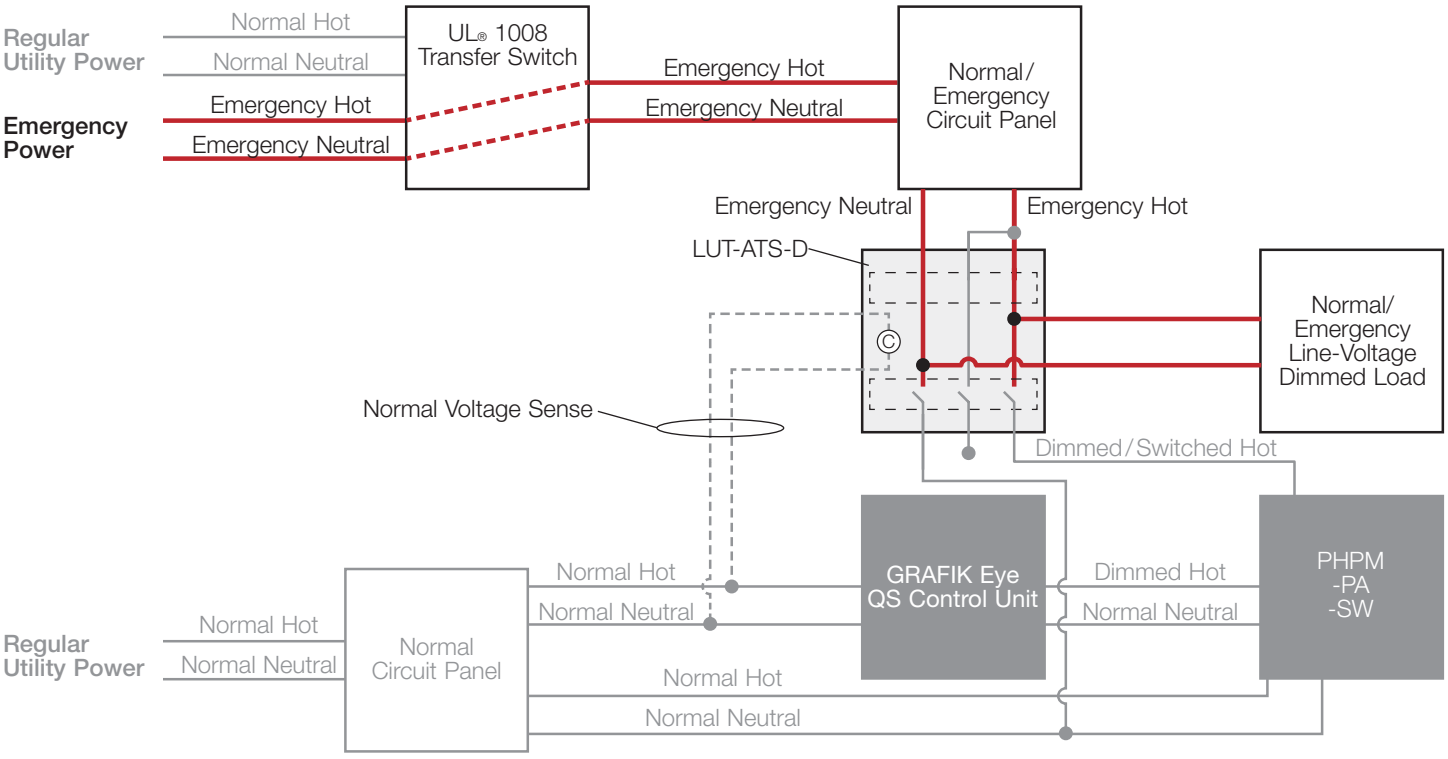
### Powered by normal power and controlling an emergency load (continued)

### Using an ALCR with PHPM-PA and/or PHPM-SW interfaces (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

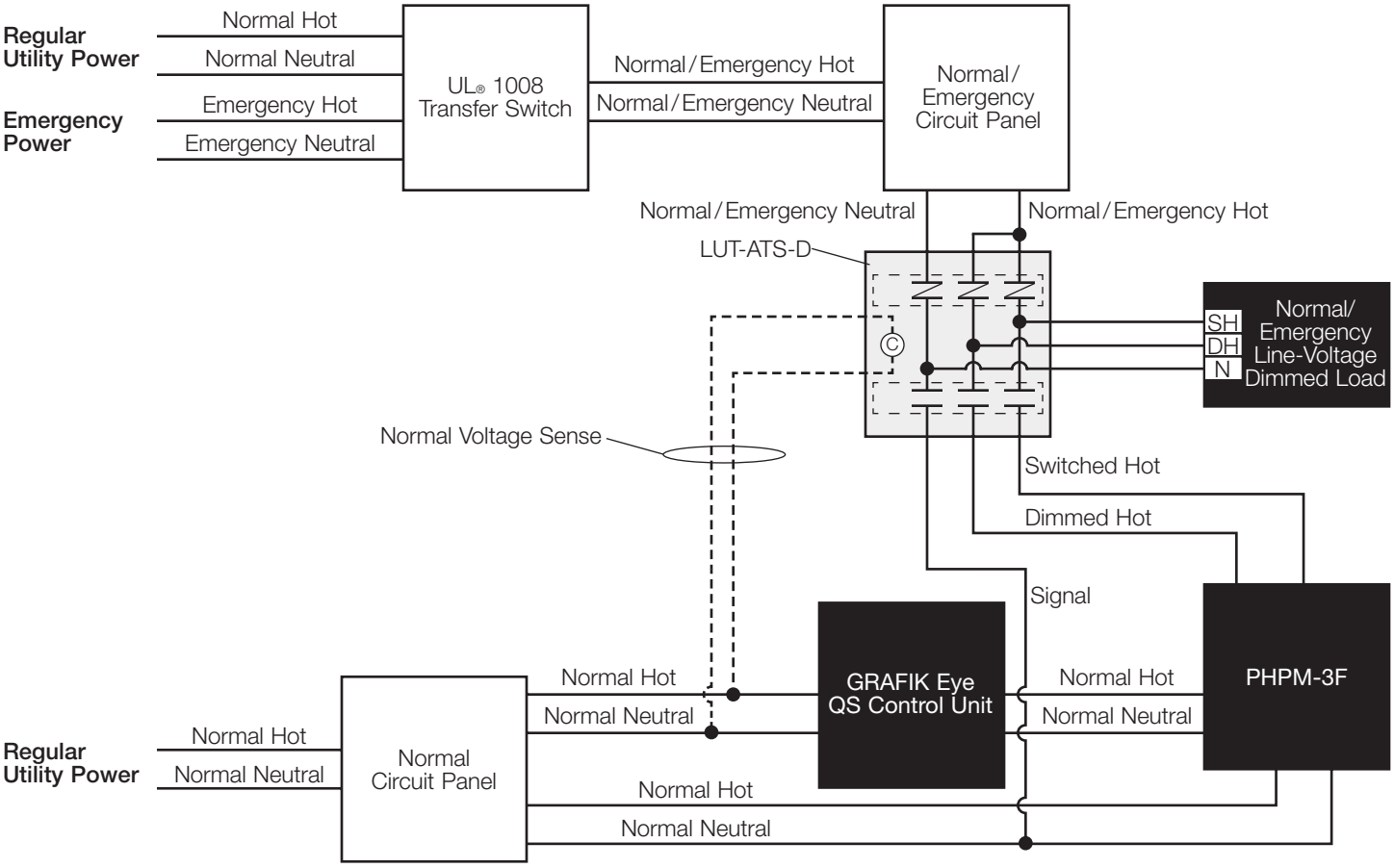
## GRAFIK Eye QS Control Unit with PHPM-3F Interface

### Powered by normal power and controlling an emergency load

#### Using an ALCR with a PHPM-3F interface

In the application where the GRAFIK Eye and load interface are on normal power and controlling an emergency load, an ALCR with multiple normally closed and multiple normally open relays is used. During regular operation the PHPM controls the load directly. During emergency operation, the load is powered directly by emergency power. An example of this type of ALCR is LUT-ATS-D from LVS Controls.

**Wiring Schematic**



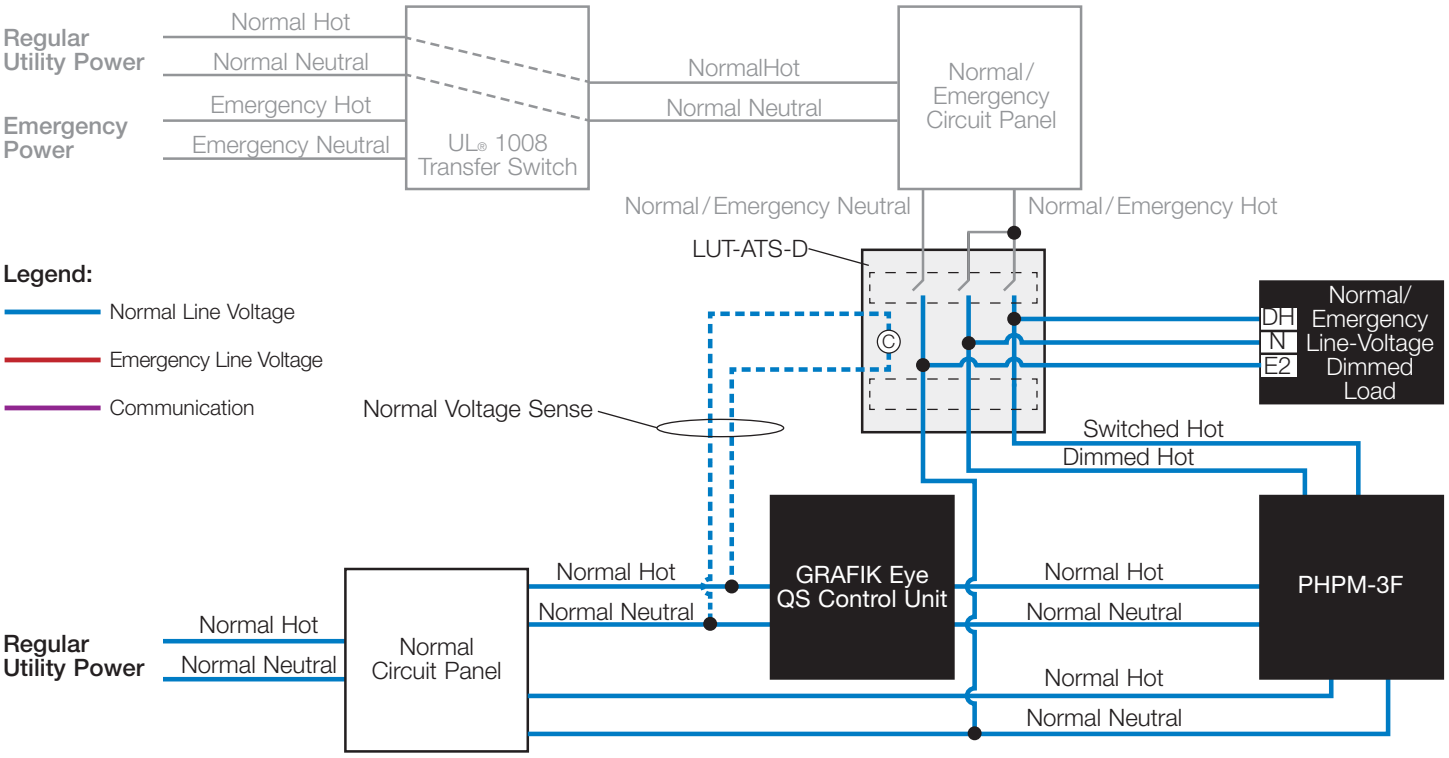
# Applications of Emergency Lighting with Lutron Systems (continued)

## GRAFIK Eye QS Control Unit with PHPM-3F Interface (continued)

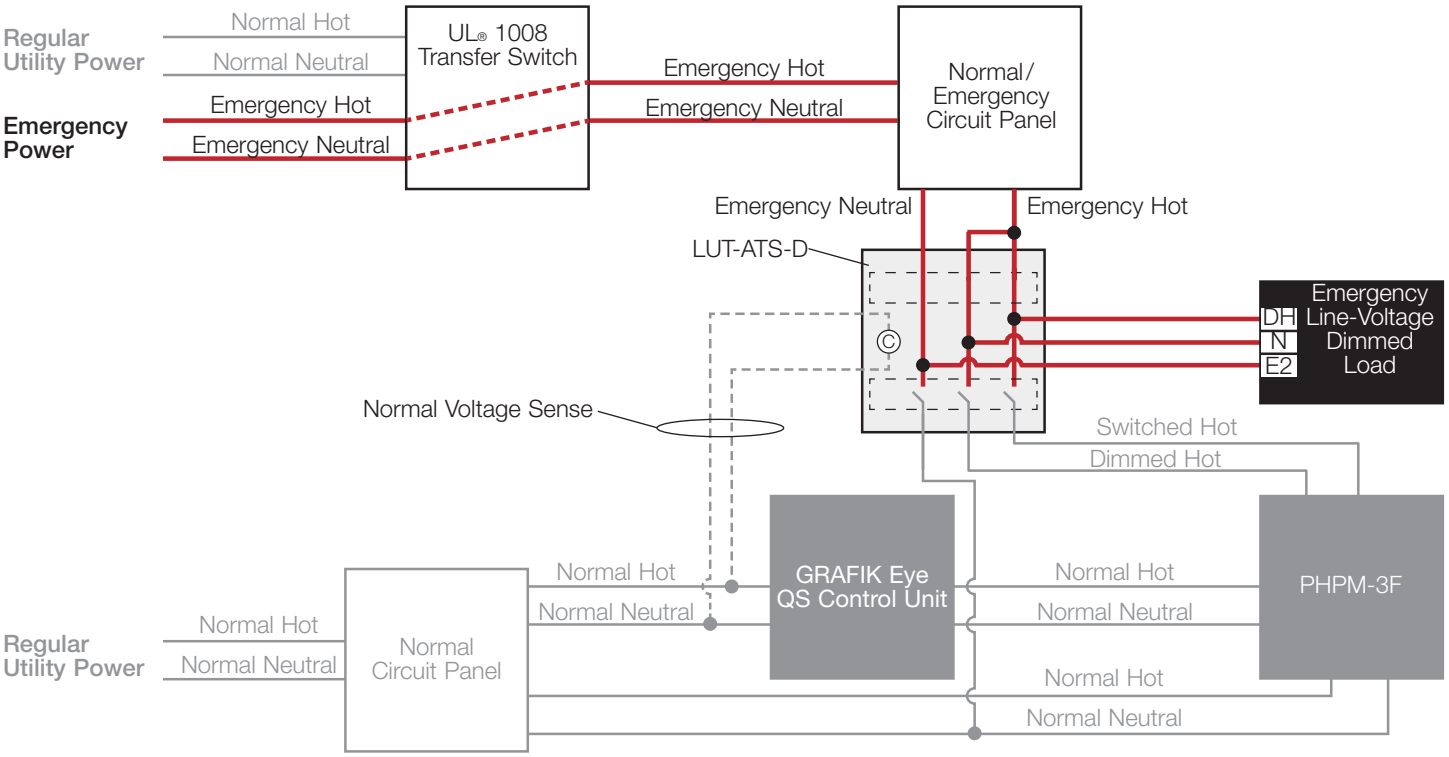
### Powered by normal power and controlling an emergency load (continued)

### Using an ALCR with a PHPM-3F interface (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

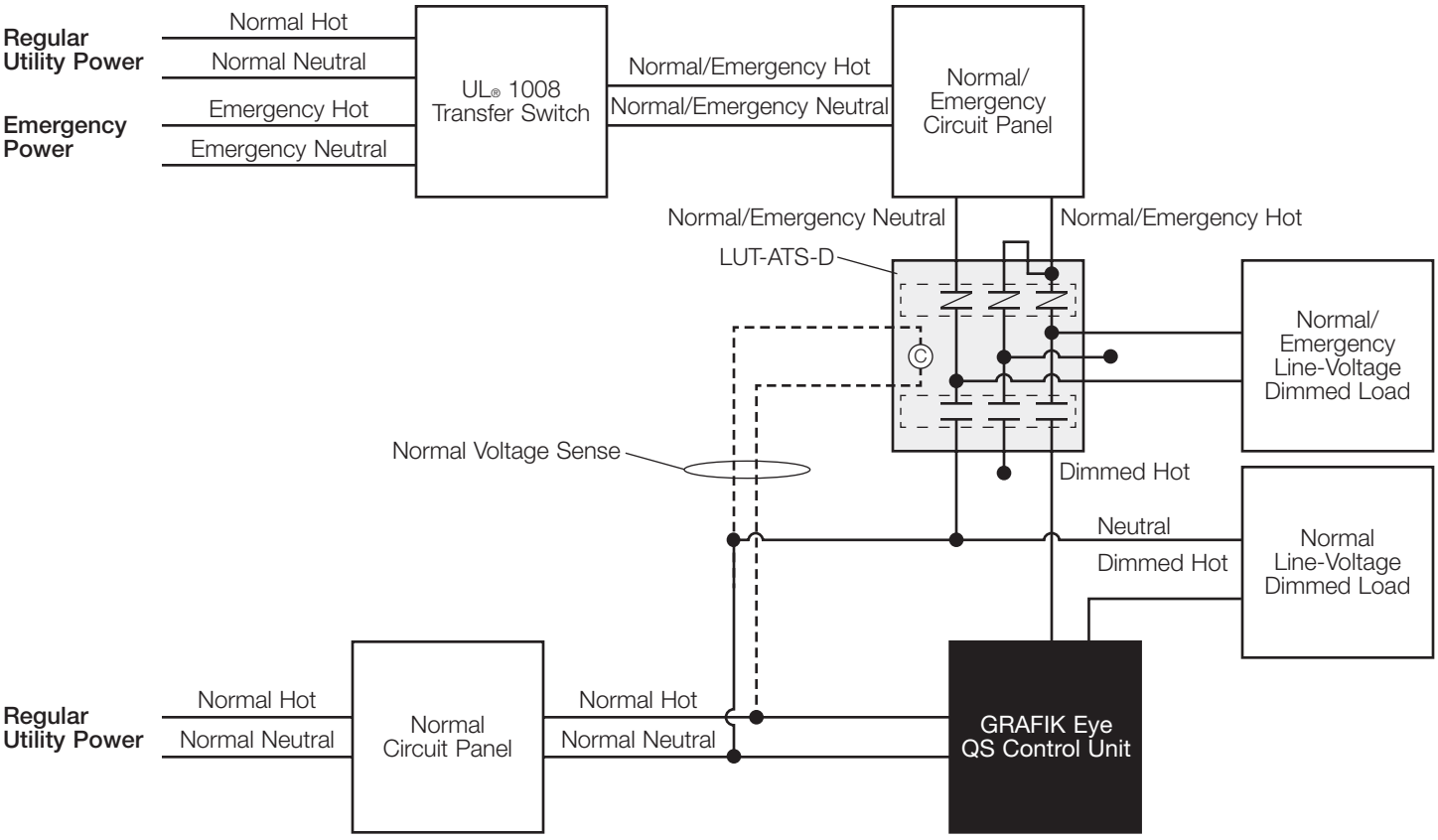
### GRAFIK Eye QS Control Unit Controlling Both Normal and Emergency Loads

#### Powered by normal power and controlling both normal and emergency loads

**Using an ALCR to control normal/emergency fixtures on one output and normal fixtures on a different output**

In the application where a GRAFIK Eye is powered by normal power and is controlling emergency loads on one zone, while controlling normal loads on another zone, an ALCR may be used. This ALCR has multiple normally open and normally closed relays. During normal operation the GRAFIK Eye will control the loads directly. During emergency operation the ALCR transfers power to the emergency load, while the GRAFIK Eye and normal loads turn off due to loss of power. An example of this type of ALCR is LUT-ATS-D from LVS Controls.

**Wiring Schematic**



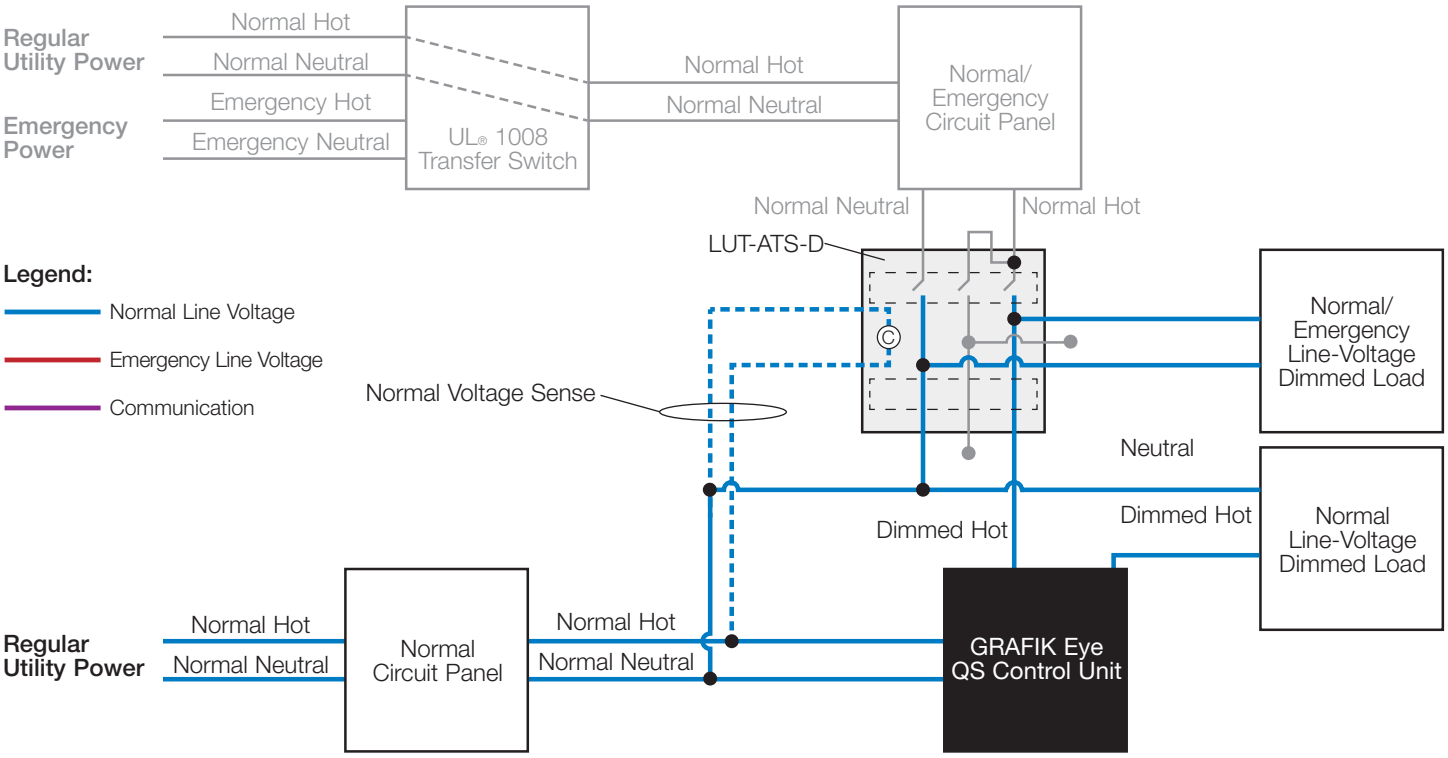
# Applications of Emergency Lighting with Lutron Systems (continued)

## GRAFIK Eye QS Control Unit Controlling Both Normal and Emergency Loads (continued)

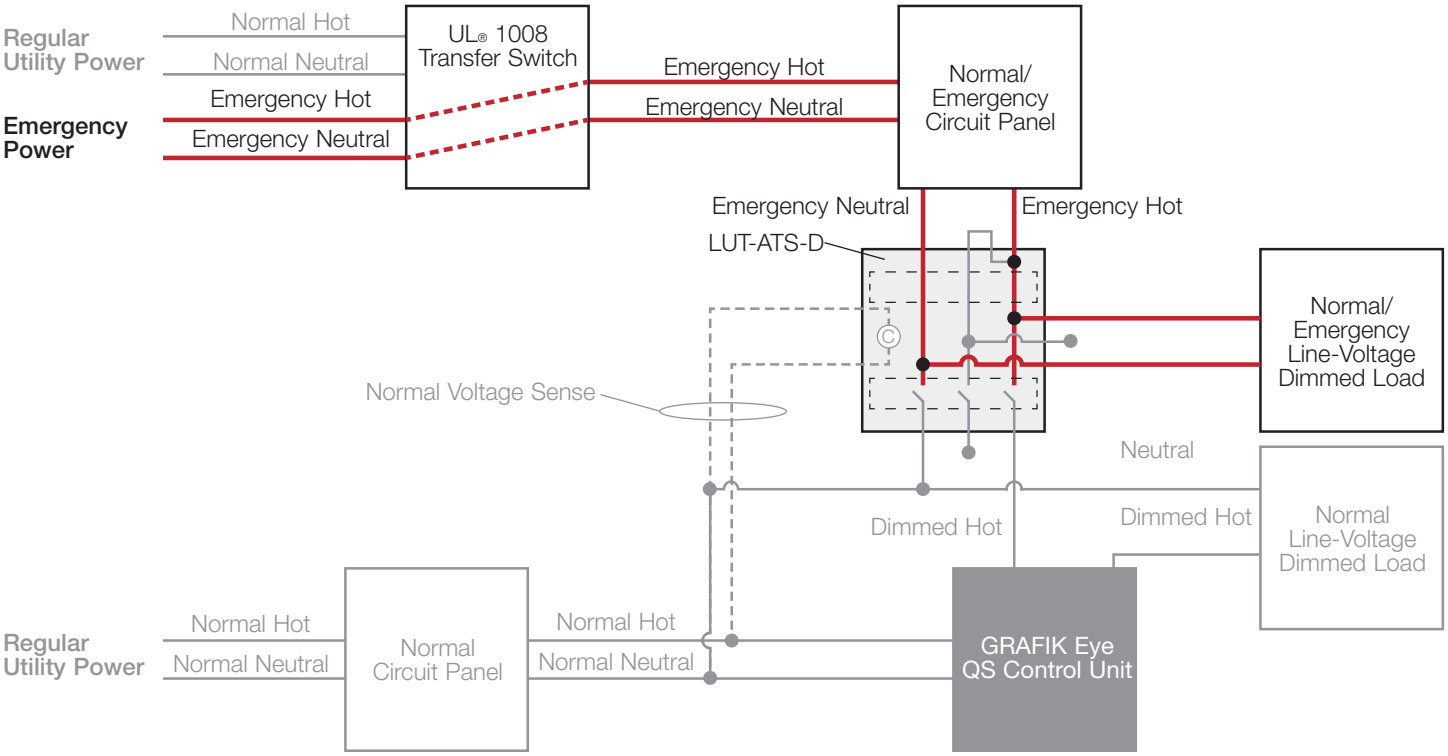
### Powered by normal power and controlling both normal and emergency loads (continued)

#### Using an ALCR to control normal/emergency fixtures on one output and normal fixtures on a different output (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

### Switching, 0-10 V, or PRO LED+ Phase Adaptive Energi Savr Node (applies to QSN-4S16, QSN-4S20, QSN2-4S20, QSN-4T16, QSN-4T20, QSN2-4T20, and QSN-4A5 only)

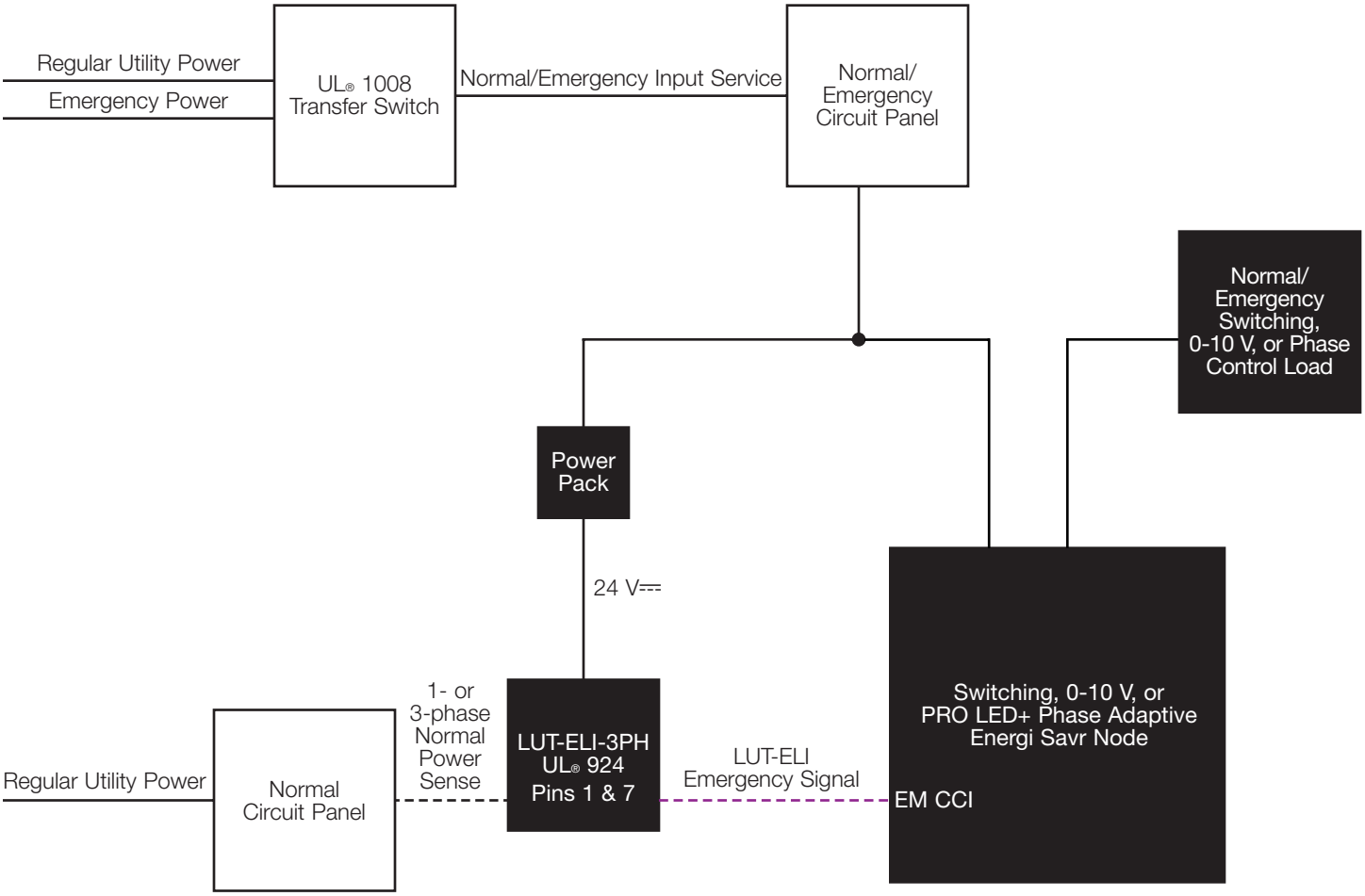
#### Powered by normal/emergency power and controlling an emergency load

#### Using the LUT-ELI for UL® 924 applications

In the application where the Energi Savr Node with Switching, 0-10 V, or PRO LED+ Phase Adaptive is being used with a LUT-ELI, no ALCR is required. The Energi Savr Node and the LUT-ELI are powered by normal/emergency power. The LUT-ELI senses normal power and when normal power is lost, the LUT-ELI sends a contact closure signal to the Energi Savr Node, which sends all the loads to their programed level and locks the unit.

**NOTE:** The LUT-ELI must be powered by 24 V⎓ from a power pack (PP- model numbers) which must be wired to a normal/emergency line-voltage circuit.

**Wiring Schematic**



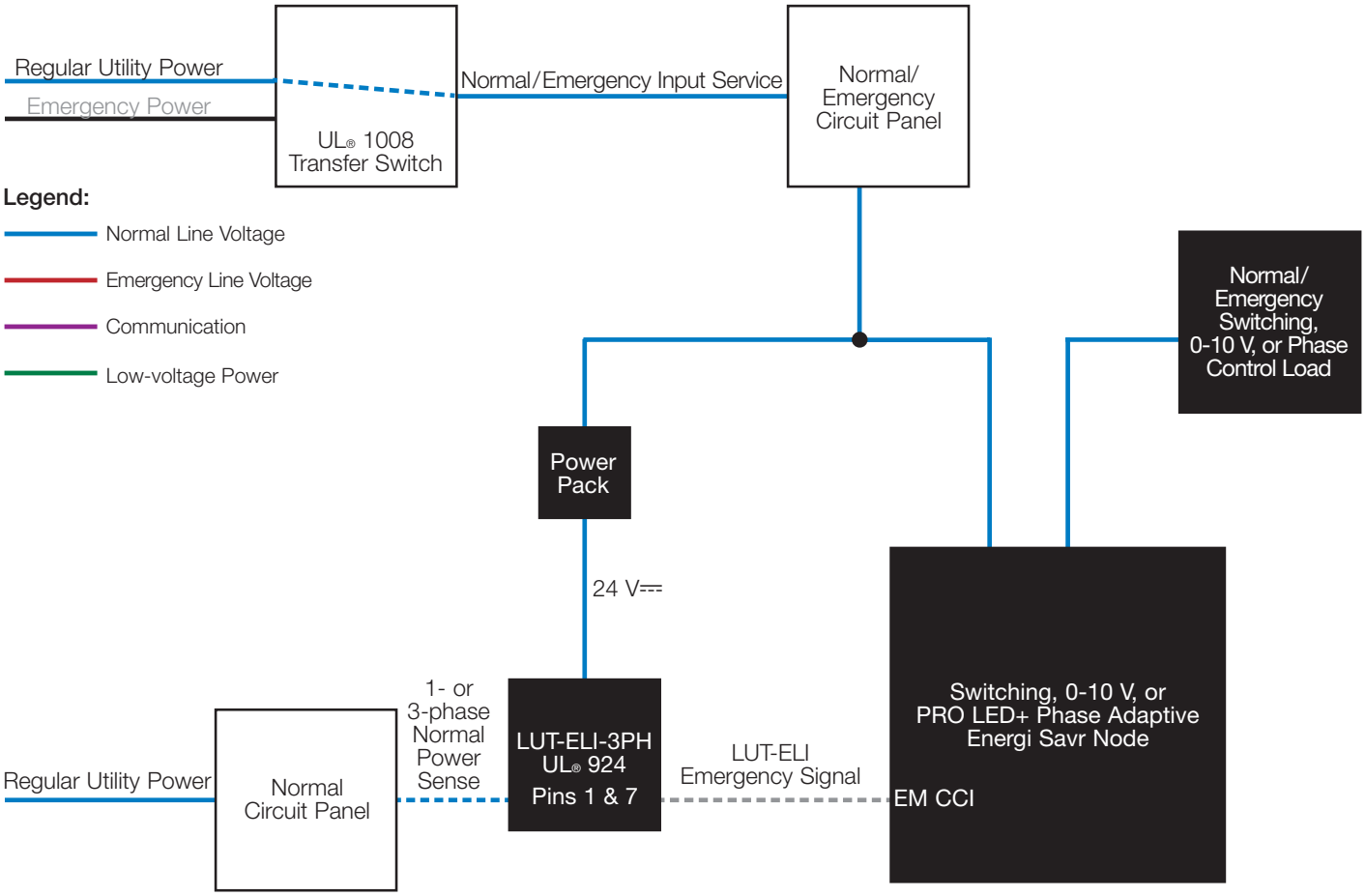
## Applications of Emergency Lighting with Lutron Systems (continued)

### Switching, 0-10 V, or PRO LED+ Phase Adaptive Energi Savr Node (applies to QSN-4S16, QSN-4S20, QSN2-4S20, QSN-4T16, QSN-4T20, QSN2-4T20, and QSN-4A5 only) (continued)

#### Powered by normal/emergency power and controlling an emergency load (continued)

#### Using the LUT-ELI for UL® 924 applications (continued)

**Regular Operation**



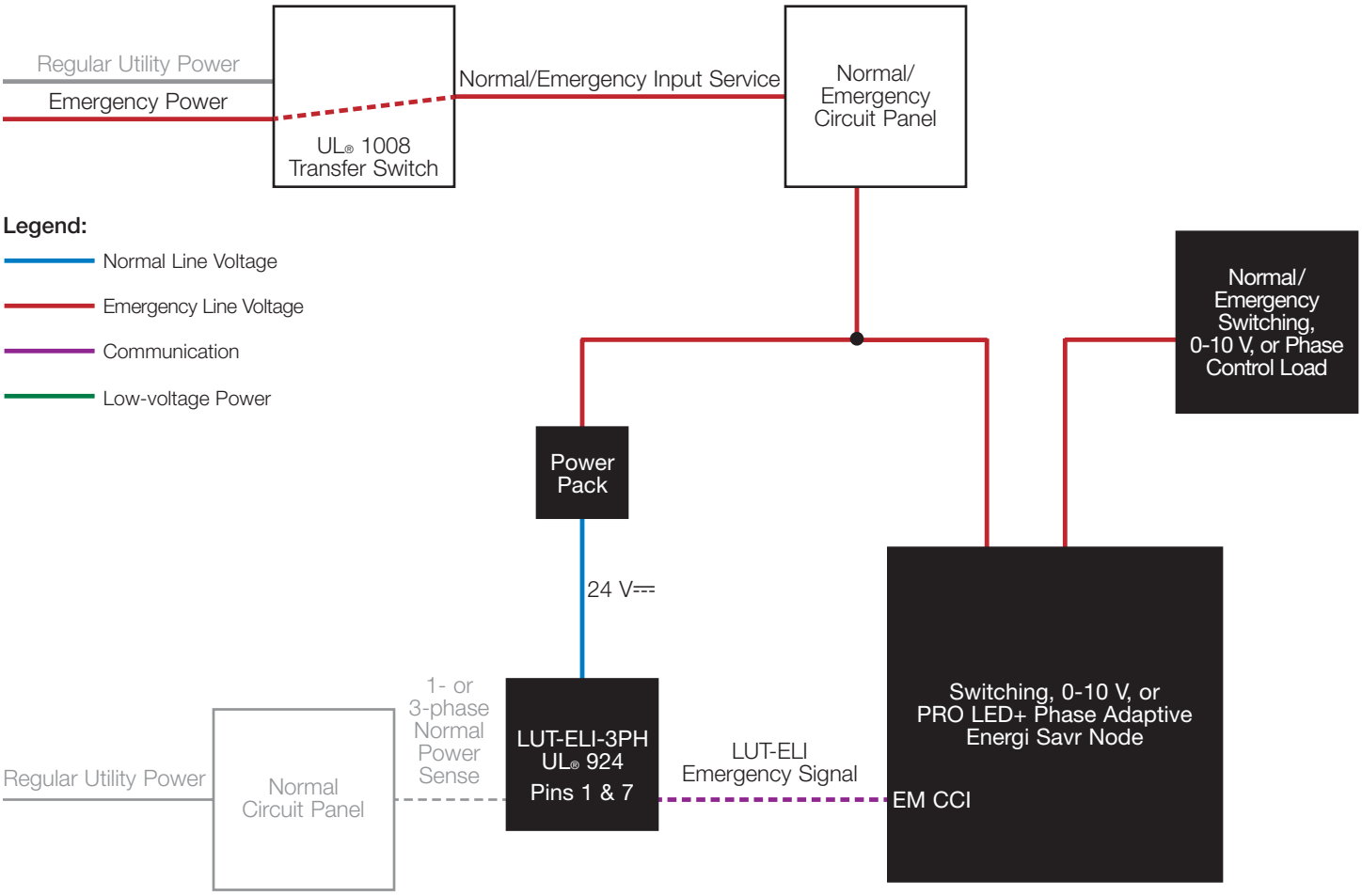
## Applications of Emergency Lighting with Lutron Systems (continued)

### Switching, 0-10 V, or PRO LED+ Phase Adaptive Energi Savr Node (applies to QSN-4S16, QSN-4S20, QSN2-4S20, QSN-4T16, QSN-4T20, QSN2-4T20, and QSN-4A5 only) (continued)

#### Powered by normal/emergency power and controlling an emergency load (continued)

#### Using the LUT-ELI for UL® 924 applications (continued)

**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Energi Savr Node Control with EcoSystem (applies to QSN-1ECO-S, QSN-2ECO-S, and QSN2-2ECO-S only)

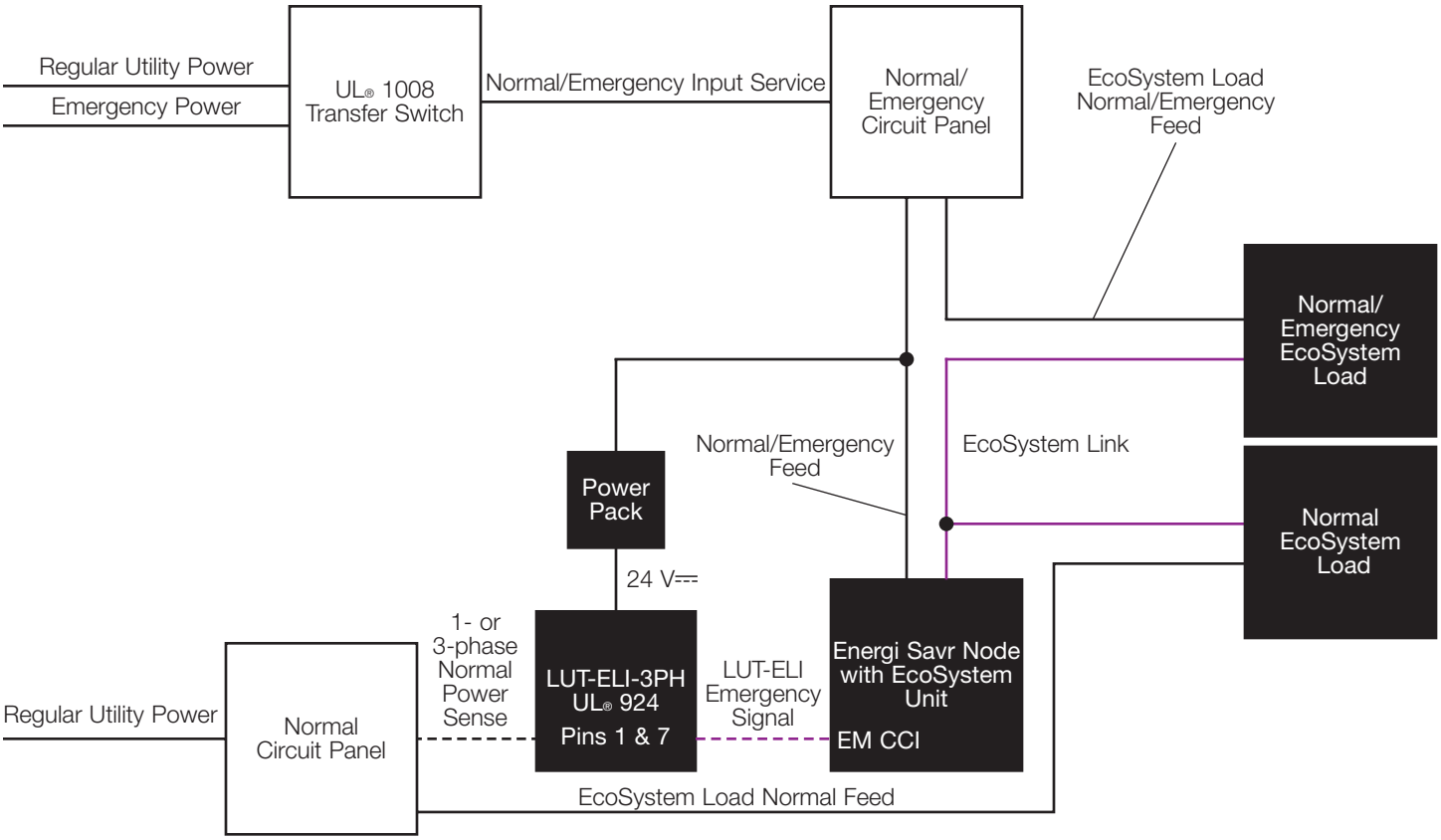
### Powered by normal/emergency power and controlling an emergency load

#### Using the LUT-ELI for UL® 924 applications

In the application where the Energi Savr Node with EcoSystem is being used with a LUT-ELI, no ALCR is required. The Energi Savr Node and LUT-ELI are powered by normal/emergency power. The LUT-ELI senses normal power and when normal power is lost, the LUT-ELI sends a signal to the Energi Savr Node, which sends all the loads to their programed level and locks the unit.

**NOTE:** The LUT-ELI must be powered by 24 V⎓ from a power pack (PP- model numbers) which must be wired to a normal/emergency line-voltage circuit.

**Wiring Schematic**



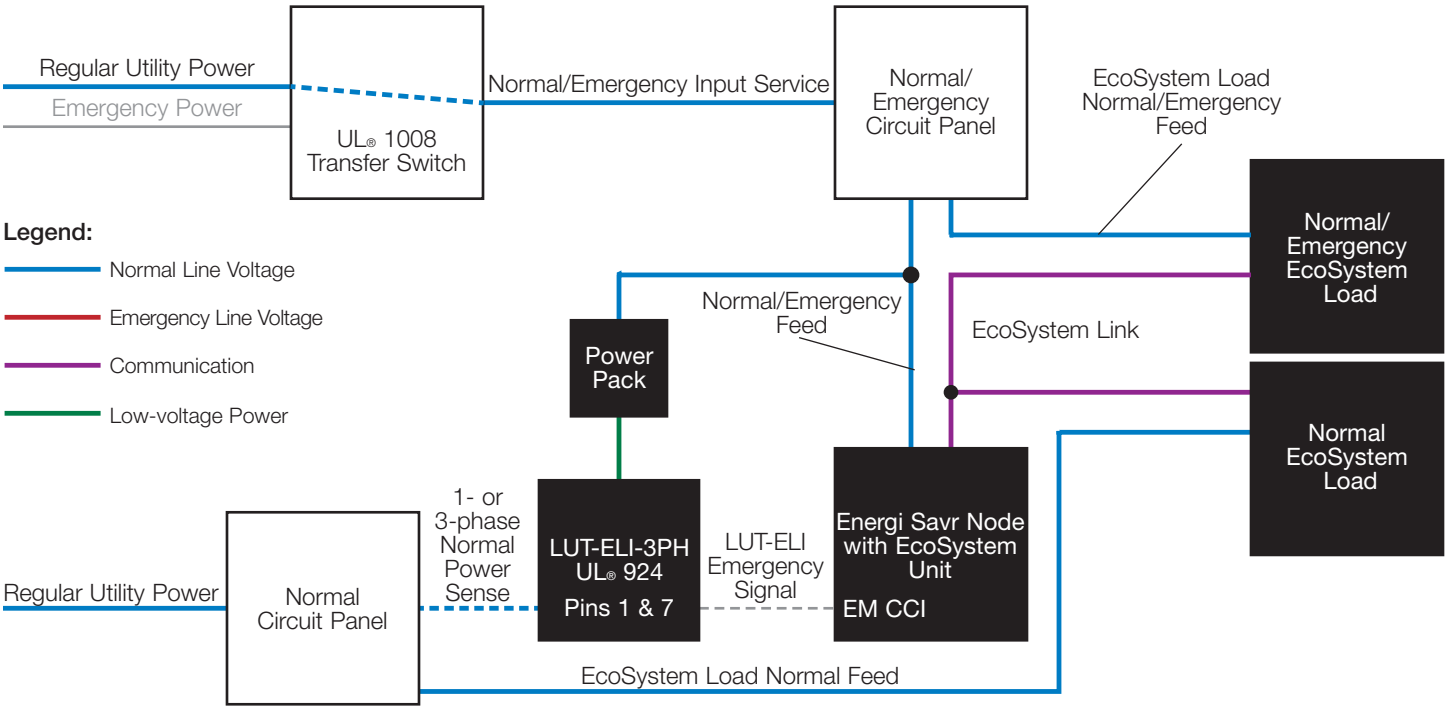
# Applications of Emergency Lighting with Lutron Systems (continued)

## Energi Savr Node Control with EcoSystem (applies to QSN-1ECO-S, QSN-2ECO-S, and QSN2-2ECO-S only) (continued)

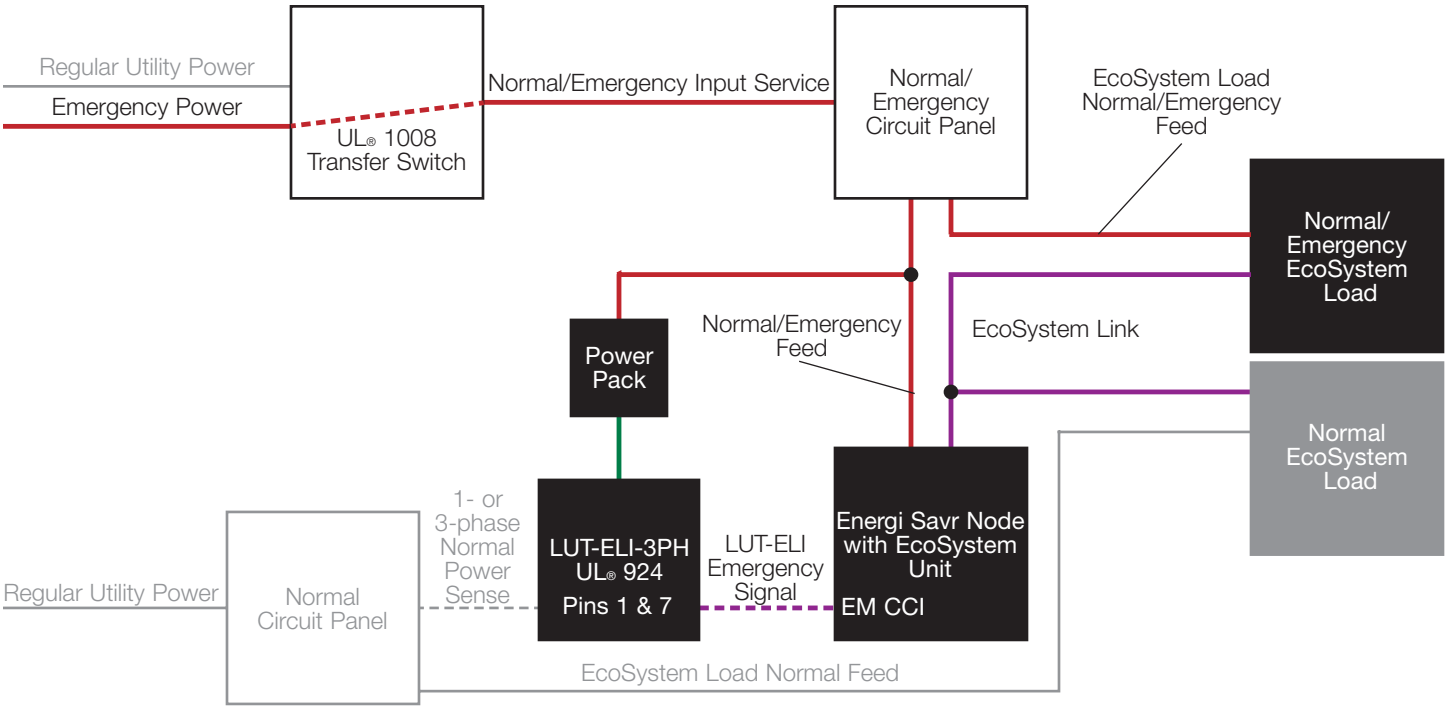
### Powered by normal/emergency power and controlling an emergency load (continued)

### Using the LUT-ELI for UL® 924 applications (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

### Athena QS DIN Rail Panel with Energi Savr Node Switching, 0-10 V⎓, PRO LED+ Phase Adaptive, or DALI Universal DIN Modules (applies to QSN-4S8-120-D, QSN-4S20-D, QSN-4T20-D, QSN-4T5-120-D, QSN-4A5-D, QSN-1DALUNV-D, and QSN-2DALUNV-D)

#### Powered by normal/emergency power and controlling an emergency load

#### Using the LUT-ELI for UL® 924 applications

The LUT-ELI is listed under UL® 924 and, when used in a lighting system with Energi Savr Node DIN modules, equips the entire emergency lighting system to also meet UL® 924 standards. It can be used with the Switching DIN module, the 0-10 V⎓ DIN module, the PRO LED+ Phase Adaptive DIN module, and the DALI® Universal DIN module. The LUT-ELI interfaces with the DIN modules through the dedicated emergency contact closure input. This contact closure input ships with a jumper installed so that the unit is not locked into emergency mode; once the LUT-ELI is installed, the jumper must be removed. When the LUT-ELI senses that any phase of normal power is lost, it opens the contact closure to the emergency CCI input on the attached DIN modules. The attached DIN modules then send all loads connected to their emergency level after which the DIN module will lock itself out from any control. When using this application, remember these key points:

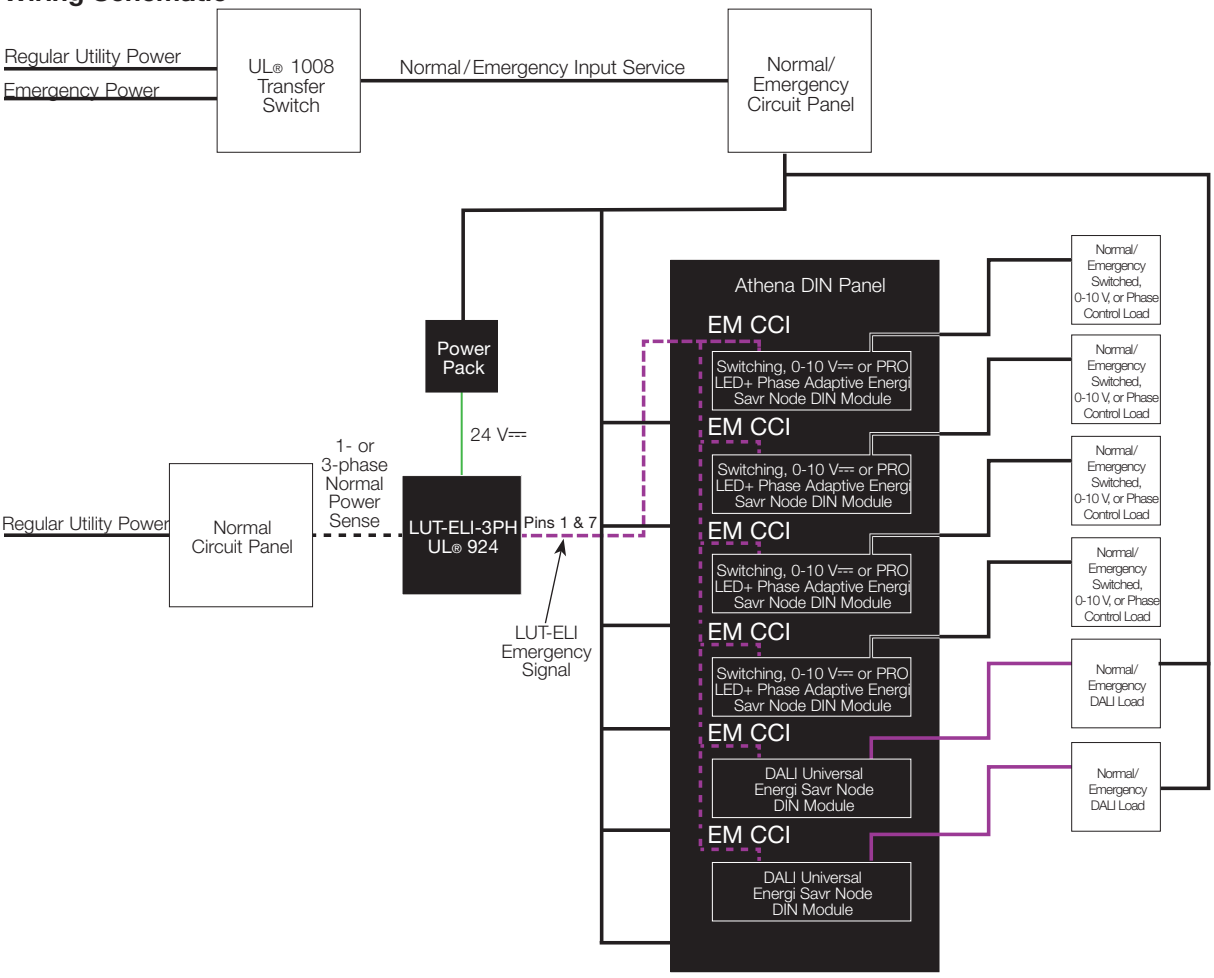
- The Energi Savr Node DIN module must be powered by normal/emergency power.
- The LUT-ELI must be powered by 24 V⎓ from a power pack (PP-DV) which must be wired to a normal/emergency line-voltage circuit.

The Energi Savr Node DIN modules cannot be fed from both normal and normal/emergency power sources at the same time. Safety codes require a physical separation between these power sources which is not provided in the units; the separation is typically provided in the UL® 1008 transfer switch.

Please refer to the LUT-ELI and Energi Savr Node DIN module installation instructions for full wiring and programming instructions for this application.

**NOTE:** All circuits in the panel must be fed by Normal/Emergency. Normal and Normal/Emergency circuits cannot be mixed in the same DIN panel.

**Wiring Schematic**



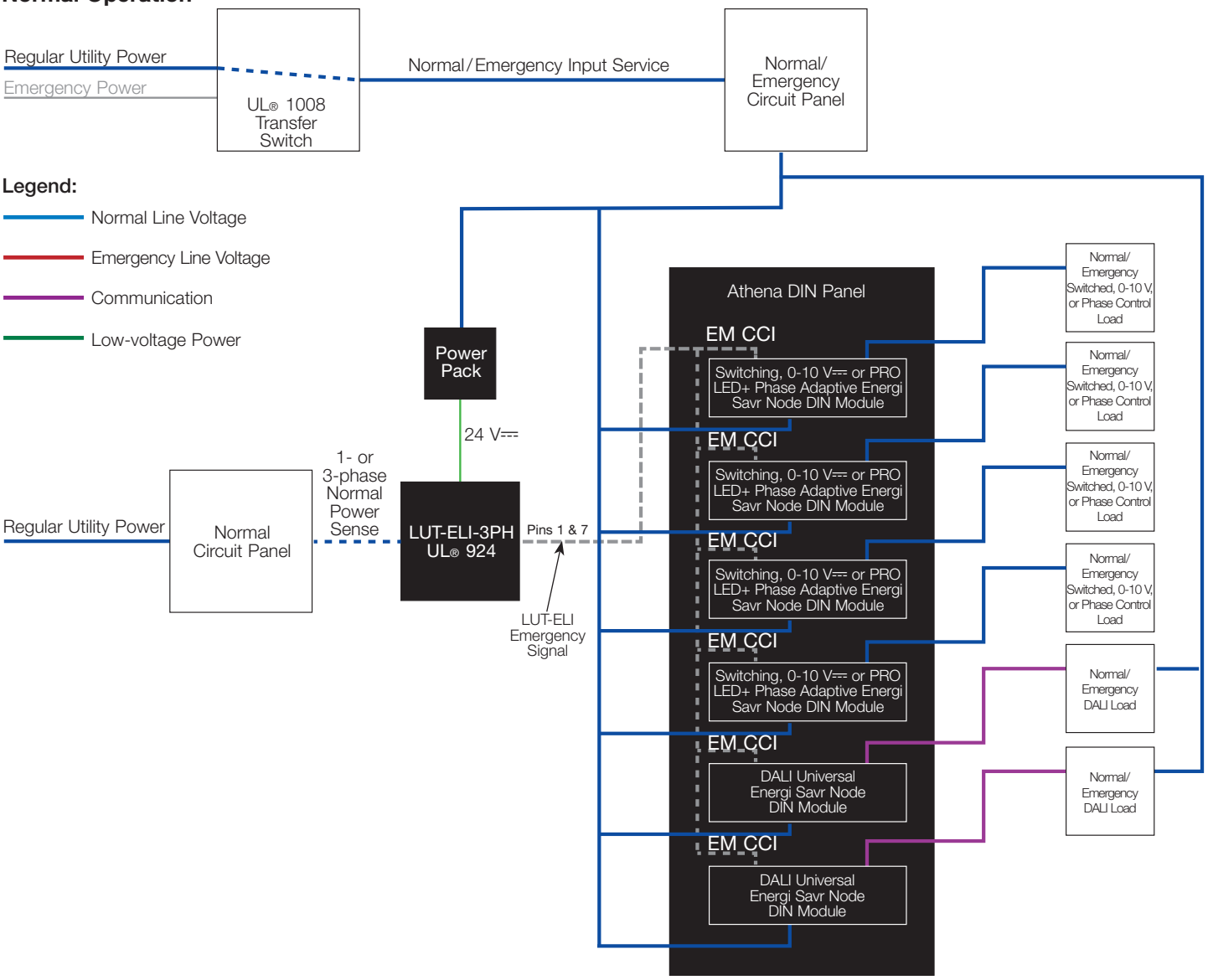
## Applications of Emergency Lighting with Lutron Systems (continued)

### Athena QS DIN Rail Panel with Energi Savr Node Switching, 0-10 V⎓, PRO LED+ Phase Adaptive, or DALI Universal DIN Modules (applies to QSN-4S8-120-D, , QSN-4S20-D, QSN-4T20-D, QSN-4T5-120-D, QSN-4A5-D, QSN-1DALUNV-D, and QSN-2DALUNV-D) (continued)

**Powered by normal/emergency power and controlling an emergency load** (continued)

**Using the LUT-ELI for UL® 924 applications** (continued)

**Normal Operation**



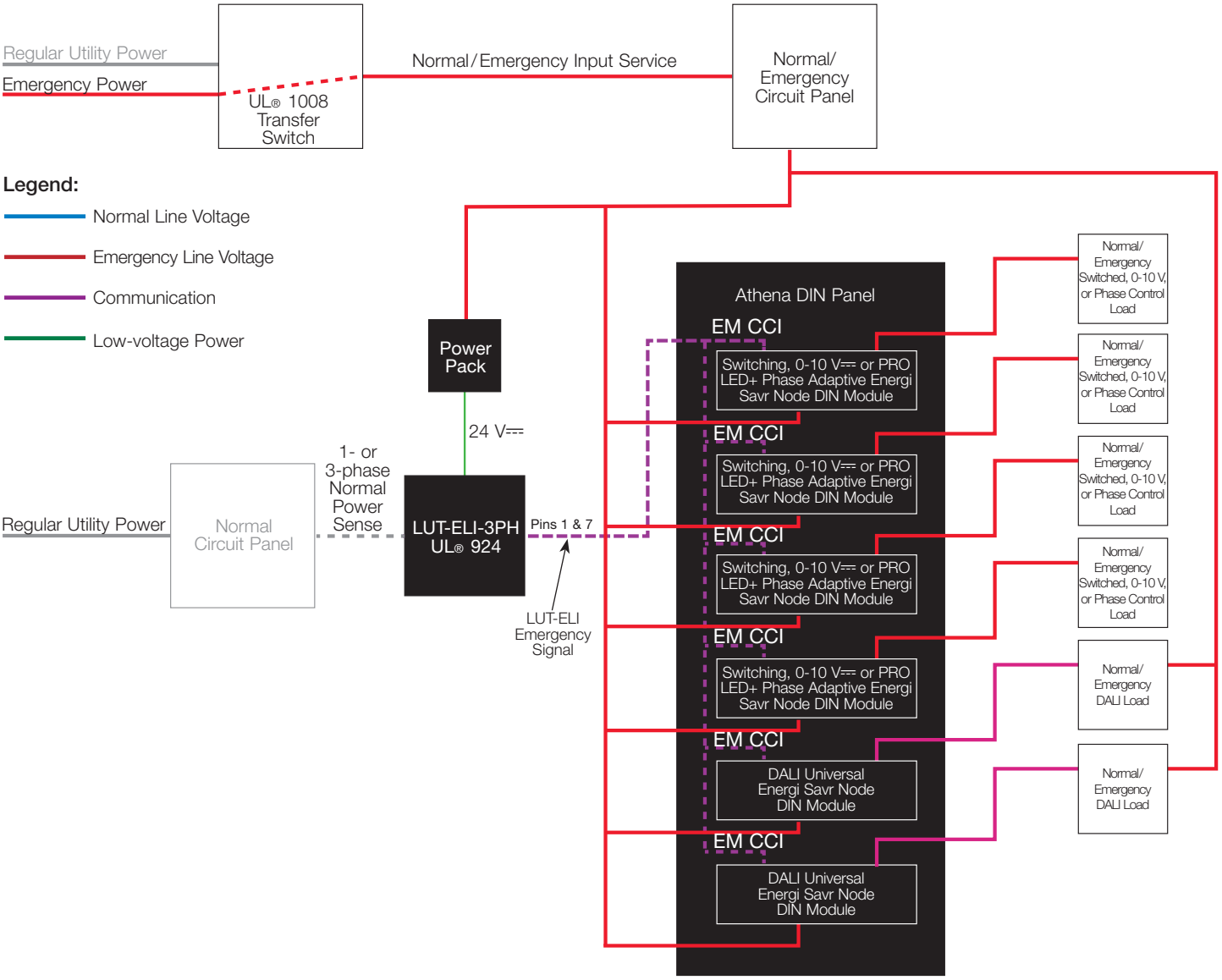
## Applications of Emergency Lighting with Lutron Systems (continued)

### Athena QS DIN Rail Panel with Energi Savr Node Switching, 0-10 V⎓, PRO LED+ Phase Adaptive, or DALI Universal DIN Modules (applies to QSN-4S8-120-D, QSN-4T5-120-D, QSN-4A5-D, QSN-1DALUNV-D, and QSN-2DALUNV-D) (continued)

#### Powered by normal/emergency power and controlling an emergency load (continued)

#### Using the LUT-ELI for UL® 924 applications (continued)

**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Energi Savr Node Control with T-Series

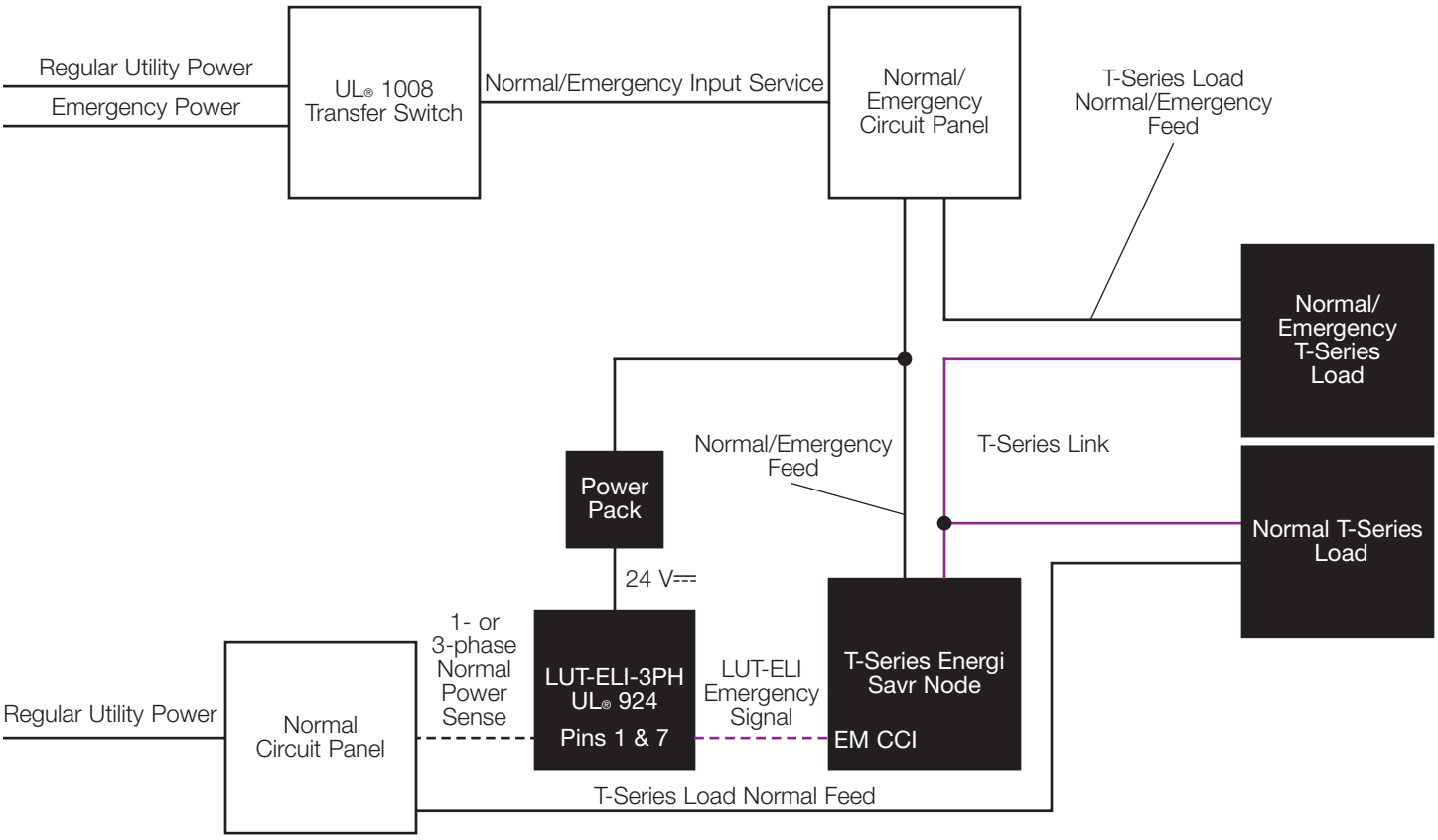
### Powered by normal/emergency power and controlling an emergency load

#### Using the LUT-ELI for UL® 924 applications

In the application where the T-Series Energi Savr Node is being used with a LUT-ELI, no ALCR is required. The Energi Savr Node and LUT-ELI are powered by normal/emergency power. The LUT-ELI senses normal power and when normal power is lost, the LUT-ELI sends a signal to the Energi Savr Node, which sends all the loads to their programed level and locks the unit.

**NOTE:** The LUT-ELI must be powered by 24 V⎓ from a power pack (PP- model numbers) which must be wired to a normal/emergency line-voltage circuit.

**Wiring Schematic**



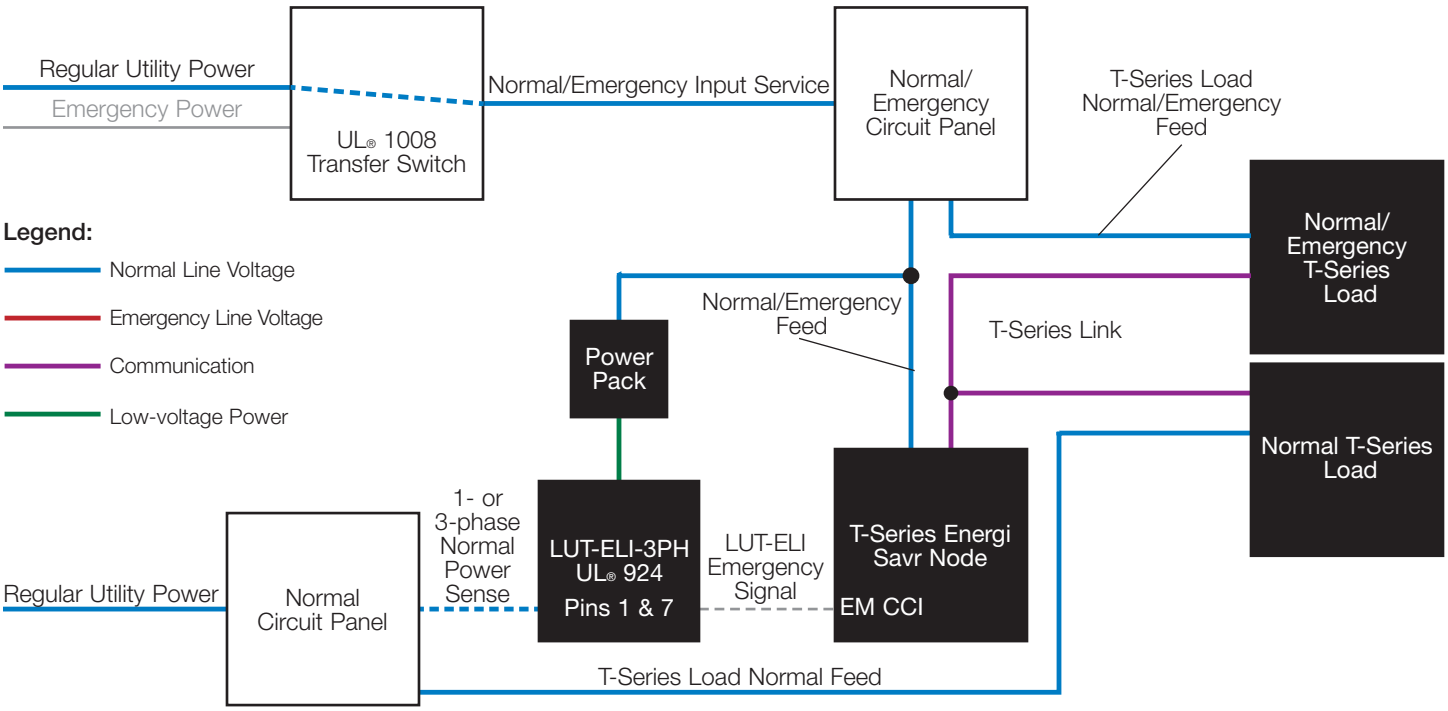
# Applications of Emergency Lighting with Lutron Systems (continued)

## Energi Savr Node Control with T-Series (continued)

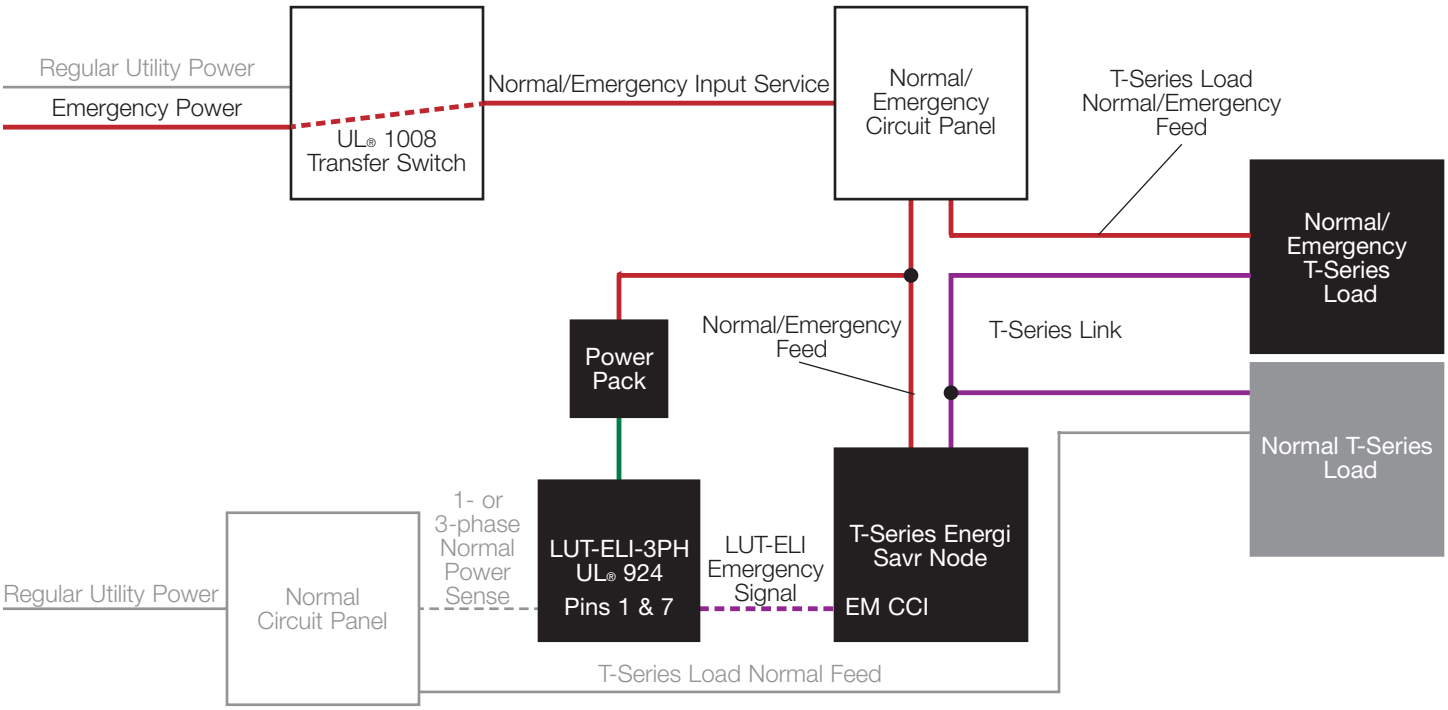
### Powered by normal/emergency power and controlling an emergency load (continued)

### Using the LUT-ELI for UL® 924 applications (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## DIN Power Modules with an Emergency CCI Connection

### Powered by normal/emergency power and controlling an emergency load

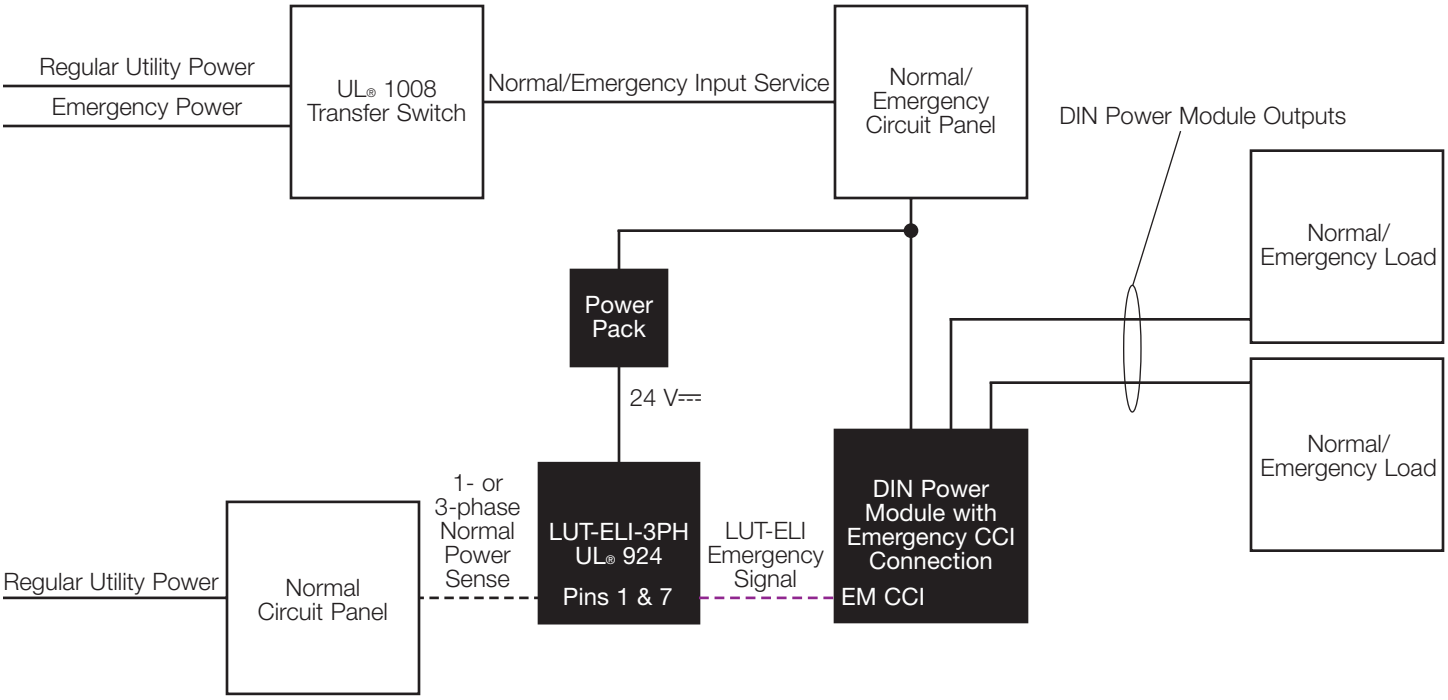
#### Using the LUT-ELI for UL® 924 applications

The LUT-ELI is listed under UL® 924 and, when used in a lighting system with a DIN power module, equips the entire emergency lighting system to also meet UL® 924 standards. It can be used with any DIN power module that has an Emergency CCI connection. The LUT-ELI interfaces with the DIN modules through the dedicated emergency contact closure input. This contact closure input ships with a jumper installed so that the unit is not locked into emergency mode; once the LUT-ELI is installed, the jumper must be removed. When the LUT-ELI senses that any phase of normal power is lost, it sends all loads connected to the DIN power module to their emergency level after which the DIN power module will lock itself out from any control. When using this application, remember these key points:

- The DIN power module must be powered by normal/emergency power.
- The LUT-ELI must be powered by 24 V⎓ from a power pack (PP- model numbers) which must be wired to a normal/emergency line-voltage circuit.
- The DIN power modules cannot be fed from both normal and normal/emergency power sources at the same time. Safety Codes require a physical separation between these power sources which is not provided in the units; the separation is typically provided in the UL® 1008 transfer switch.

Please refer to the LUT-ELI and Energi Savr Node unit installation instructions for full wiring and programming instructions for this application.

**Wiring Schematic**



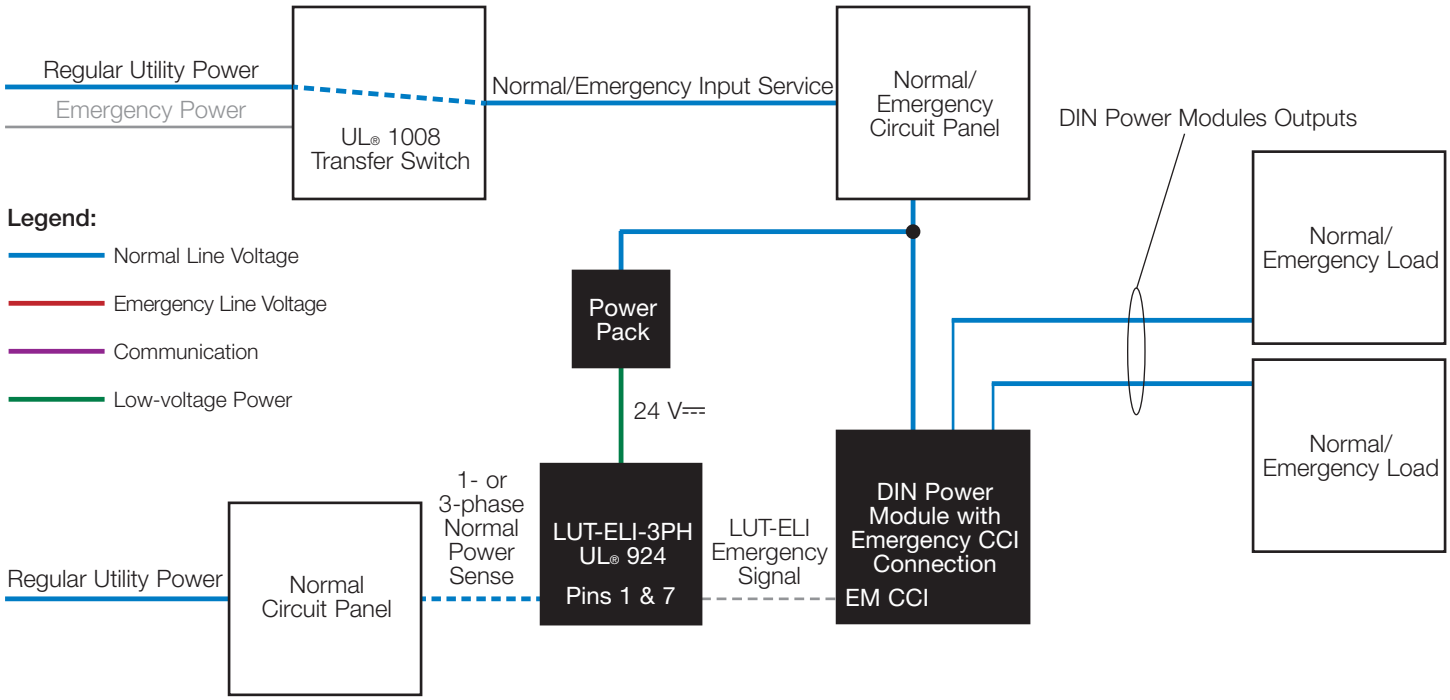
# Applications of Emergency Lighting with Lutron Systems (continued)

## DIN Power Modules with an Emergency CCI Connection (continued)

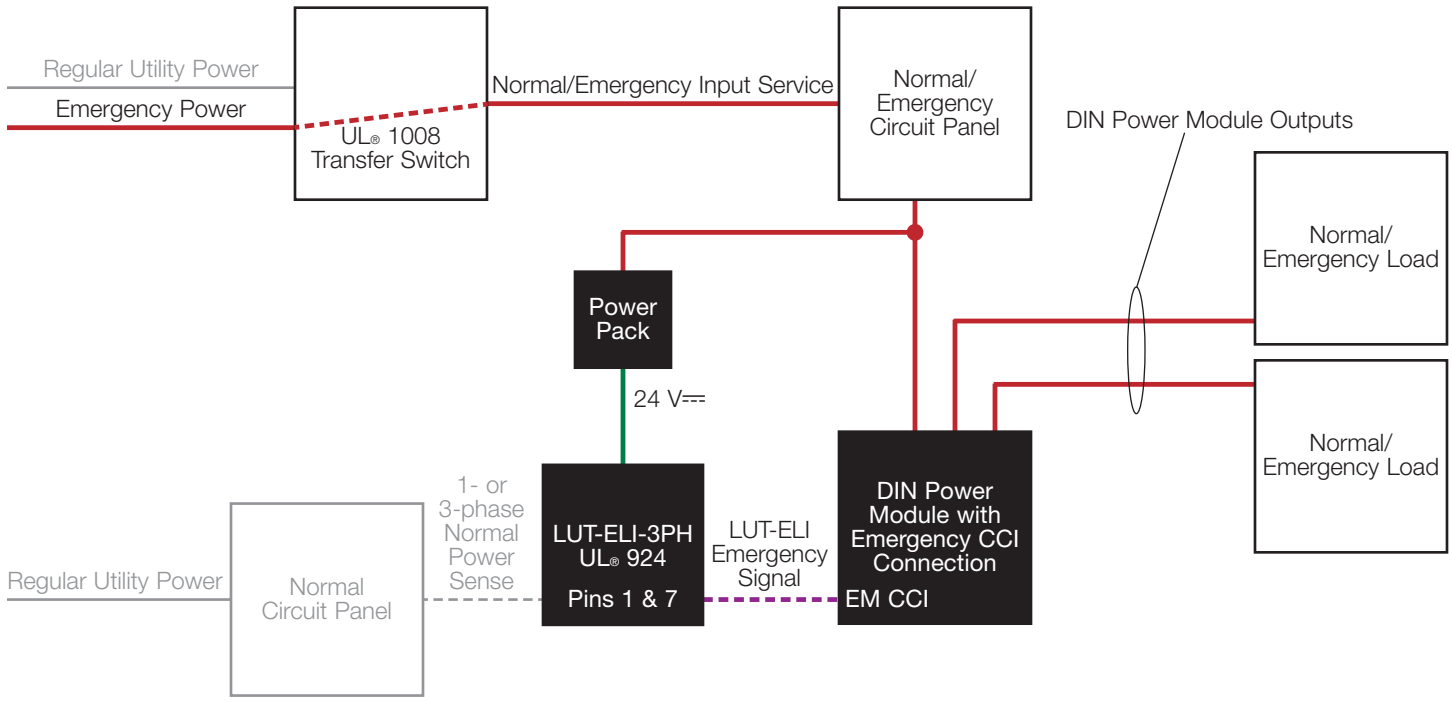
### Powered by normal/emergency power and controlling an emergency load (continued)

### Using the LUT-ELI for UL® 924 applications (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

### Power Panels (applies to GP, XP, LP, CCP, LCP, and XPS panels only)

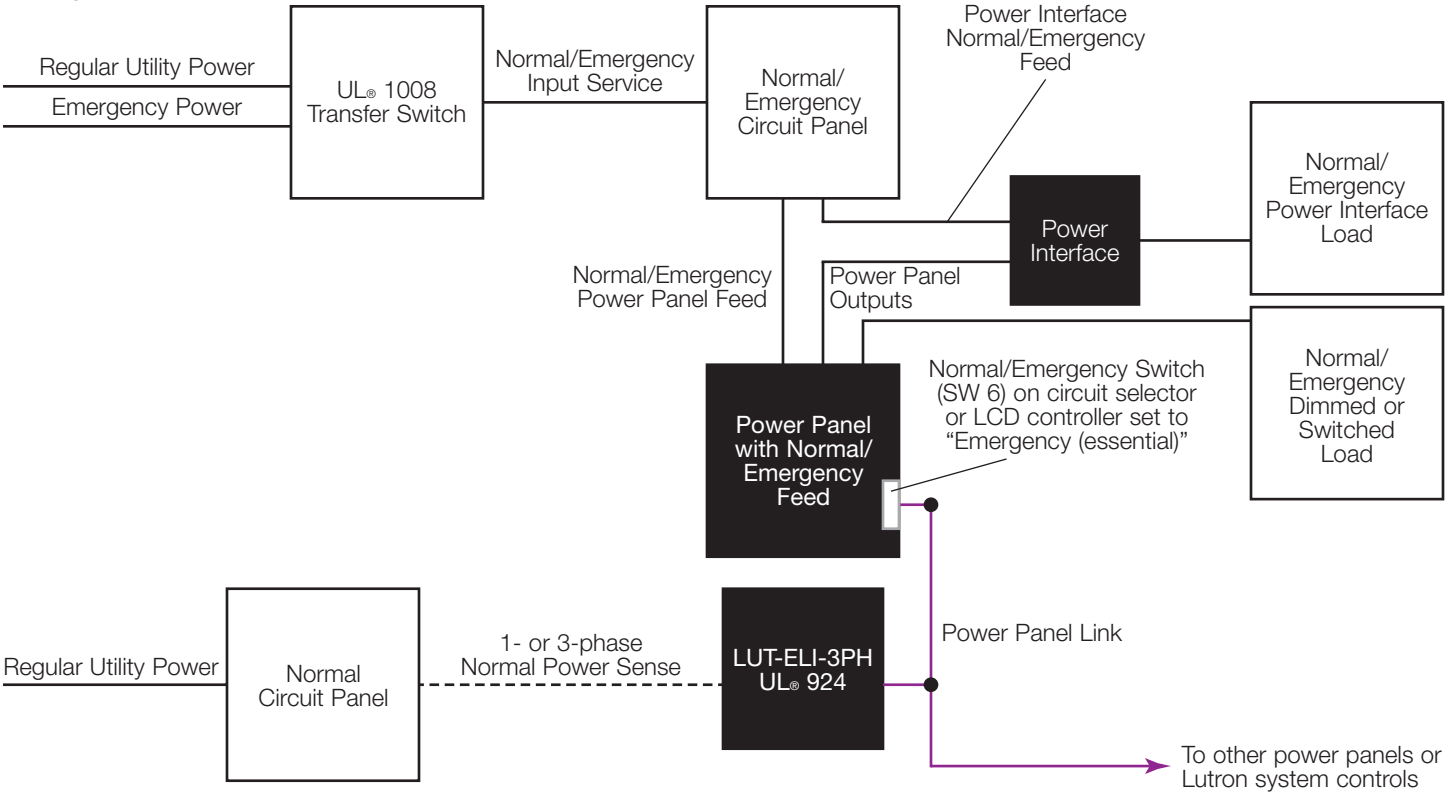
#### Powered by normal/emergency power and controlling an emergency load

##### Using the LUT-ELI for UL® 924 applications

The LUT-ELI is listed under UL® 924 and, when used in a lighting system with Lutron power panels, equips the entire emergency lighting system to also meet UL® 924 standards. It can be used with all types of dimming and switching power panels. The LUT-ELI interfaces with the panels by sending a contact closure signal to terminal 5 (sense) on the power panel link. When the LUT-ELI senses that any phase of normal power is lost, it sends all loads connected to the power panel to their emergency level after which the panel will lock itself out from any control. When using this application, remember these key points:

- The power panel must be powered by a normal/emergency source.
- The normal/emergency switch on the LCD controller or circuit selector must be set to Emergency (essential).
- If using a power interface that controls emergency lighting, the interface must also be powered by normal/emergency power.
- Safety Codes require a physical separation between normal and normal/emergency power sources; typically, this is provided in the UL® 1008 transfer switch. Although a dedicated power panel for normal and normal/emergency circuits is common, some Lutron power panels contain a physical barrier to provide the required separation between normal and normal/emergency circuits. Contact your local Lutron representative if this application is required.

**Wiring Schematic**



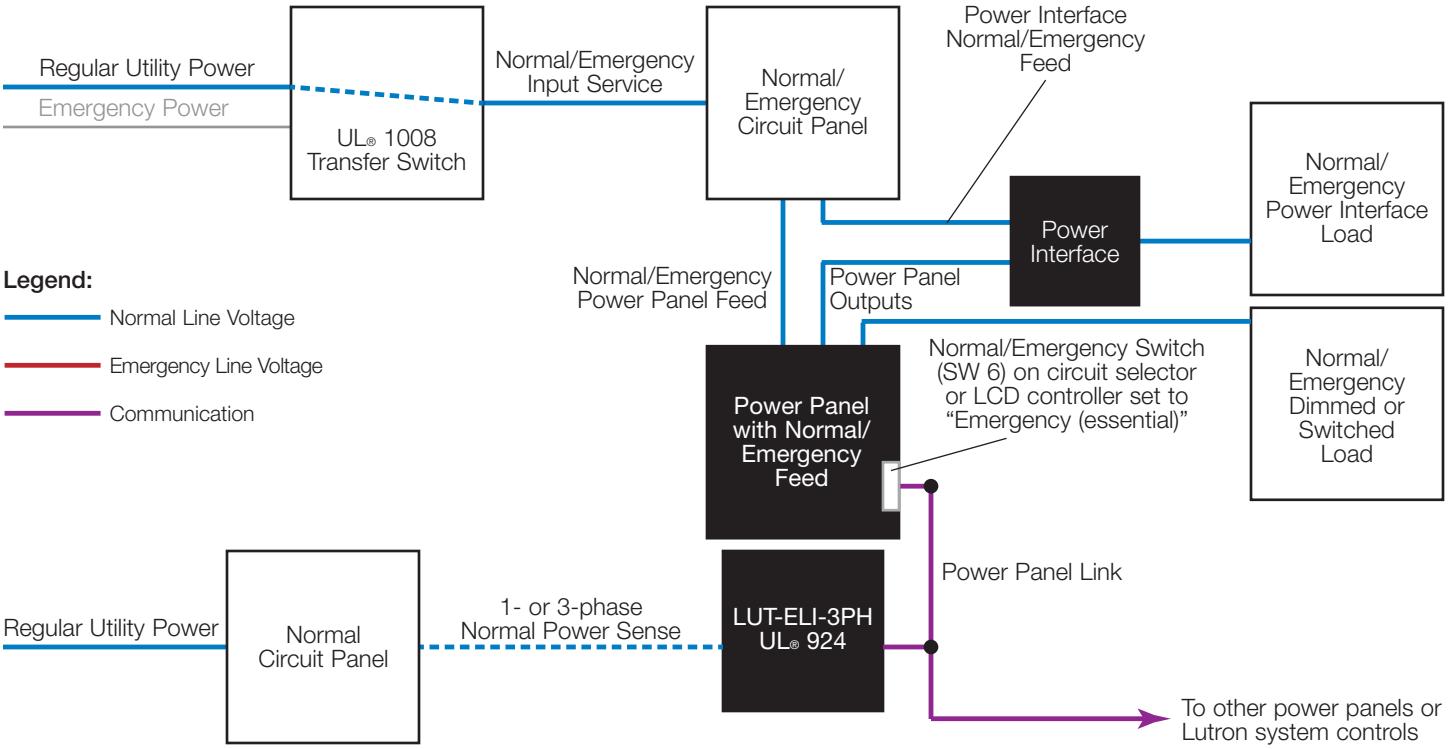
# Applications of Emergency Lighting with Lutron Systems (continued)

## Power Panels (applies to GP, XP, LP, CCP, LCP, and XPS panels only) (continued)

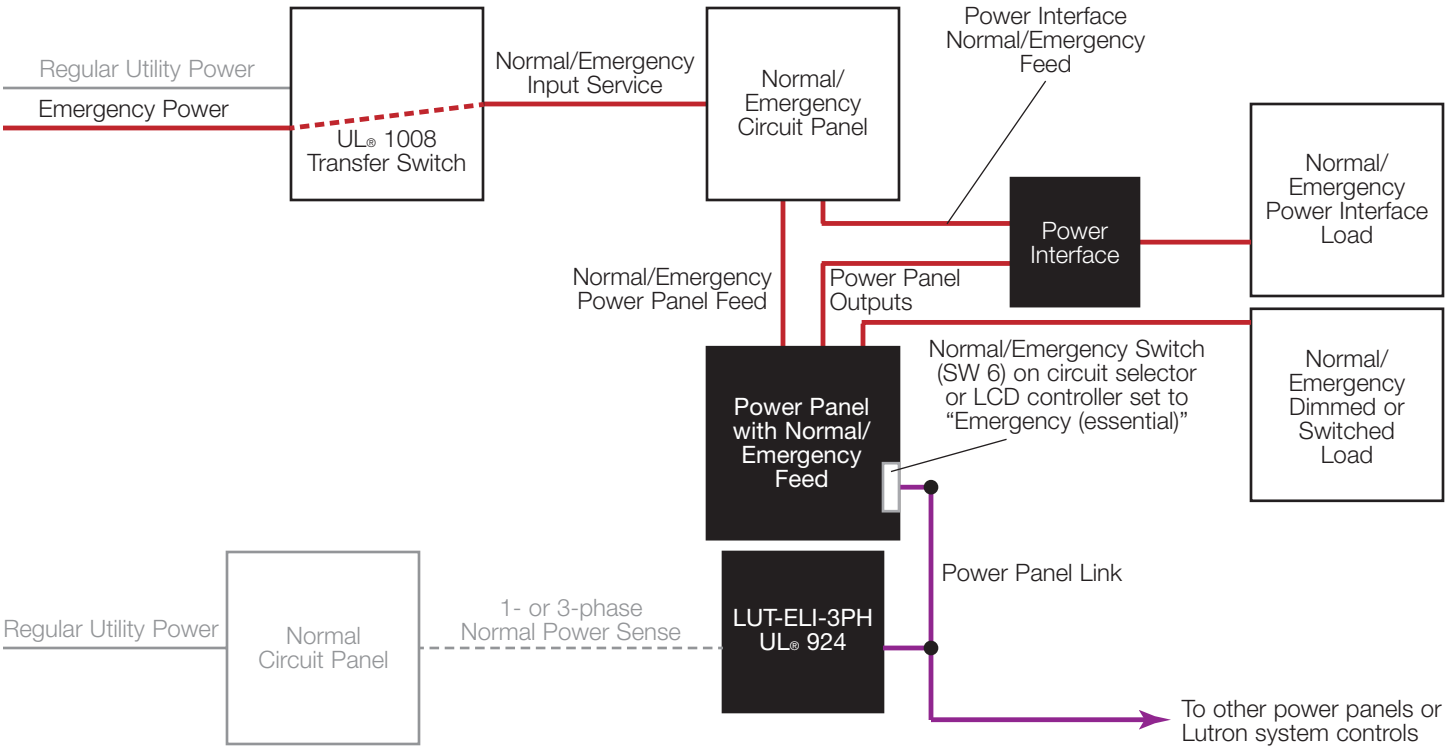
### Powered by normal/emergency power and controlling an emergency load (continued)

#### Using the LUT-ELI for UL® 924 applications (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

### Power Panels (applies to GP, XP, LP, CCP, LCP, and XPS panels only) (continued)

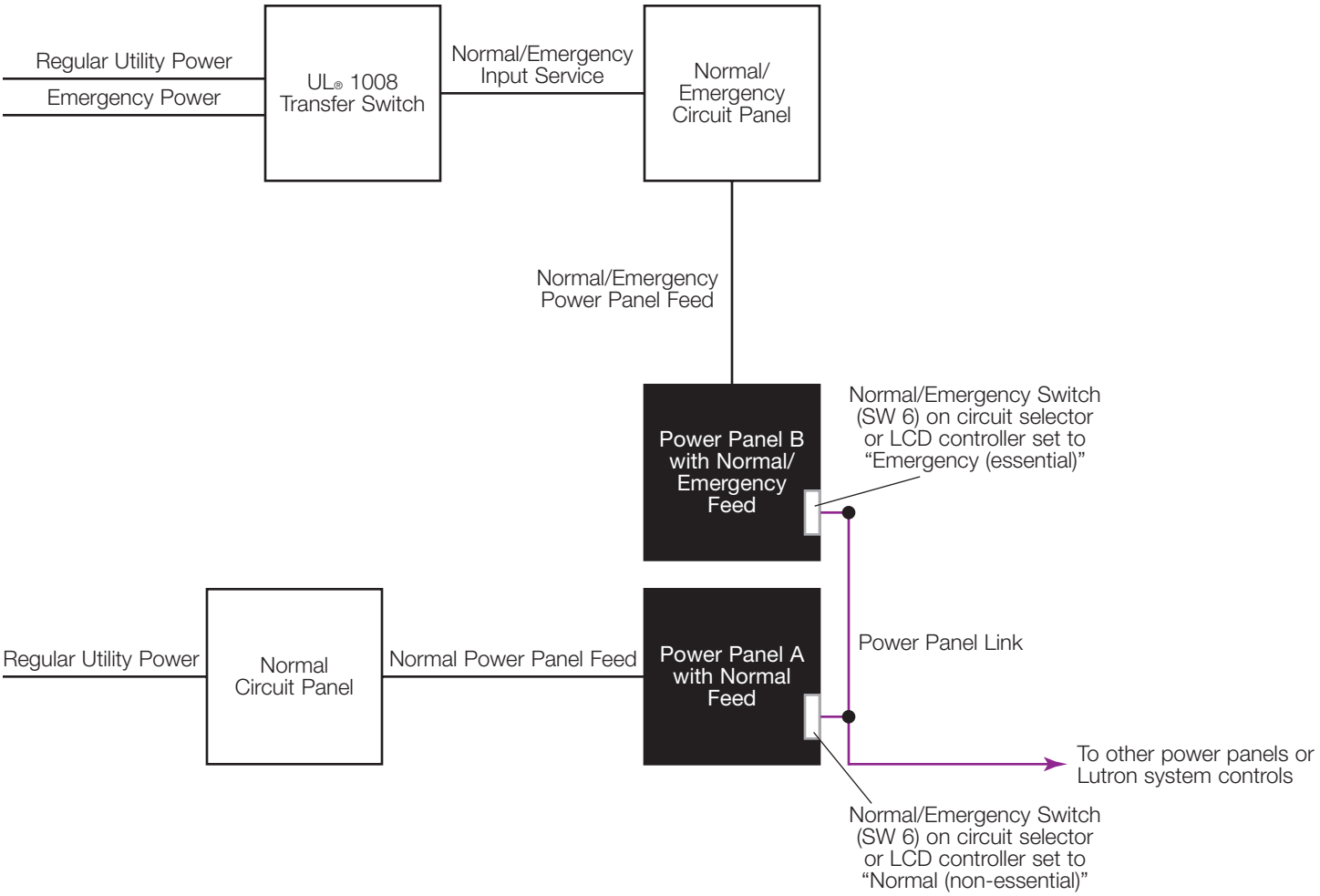
#### Powered by normal/emergency power and controlling an emergency load (continued)

**Applications not requiring UL® 924**

Lutron power panels can sense the loss of normal power and signal other panels to go into emergency mode. This application does not require any extra equipment nor does it satisfy the requirements of UL® 924.

- Applications not requiring UL® 924 can have different panels, one fed with normal power and the other fed with normal/emergency power; both panels must be on the same panel communication link.
- All emergency panels must have their normal/emergency switches set to “Emergency (essential)”. The panel used to sense normal power must have its switch set to “Normal (non-essential)”.
- Terminal 5 (sense) on the normal panel’s circuit selector or LCD controller provides a sense voltage to the normal/emergency panels. When normal power drops out, this sense voltage turns off, signaling the normal/emergency panels to send all of their loads to emergency level and to lock out any control.

**Wiring Schematic**



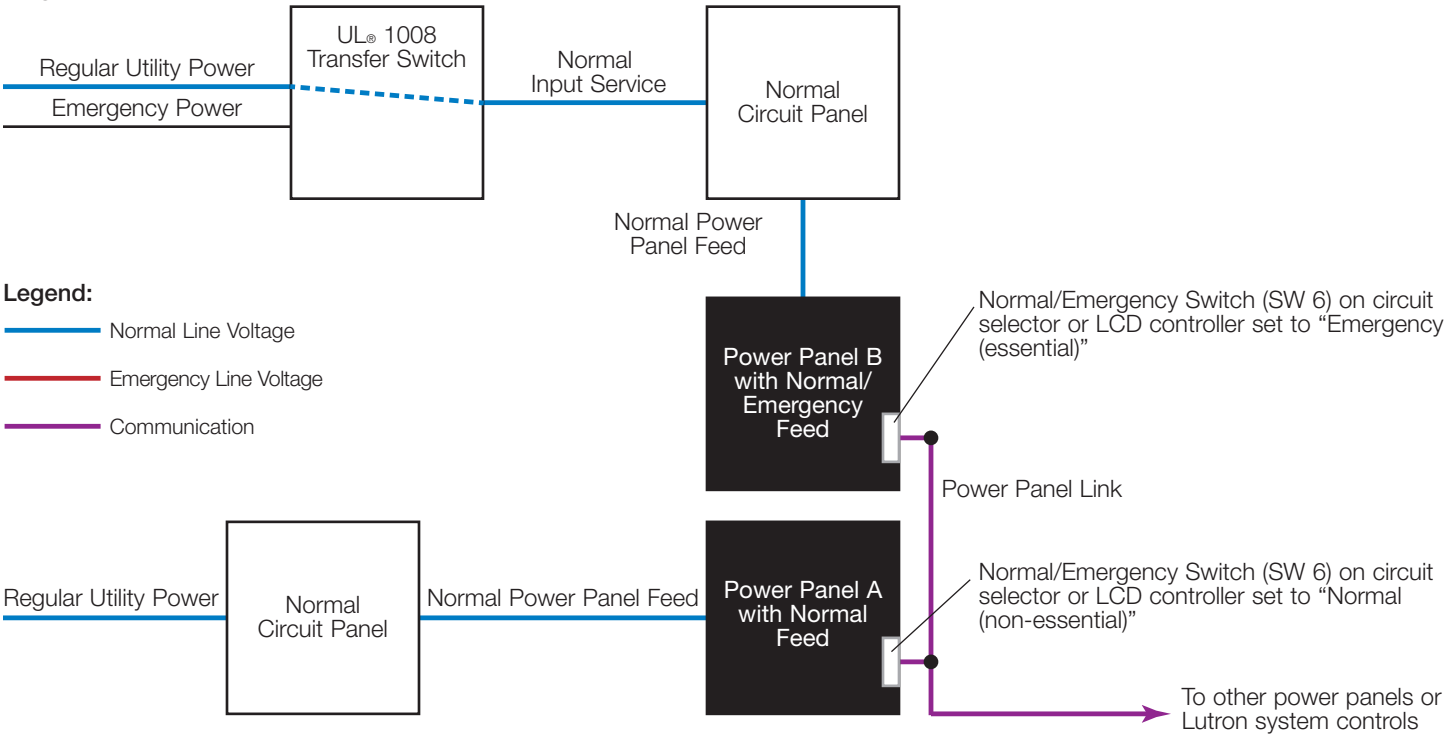
## Applications of Emergency Lighting with Lutron Systems (continued)

### Power Panels (applies to GP, XP, LP, CCP, LCP, and XPS panels only) (continued)

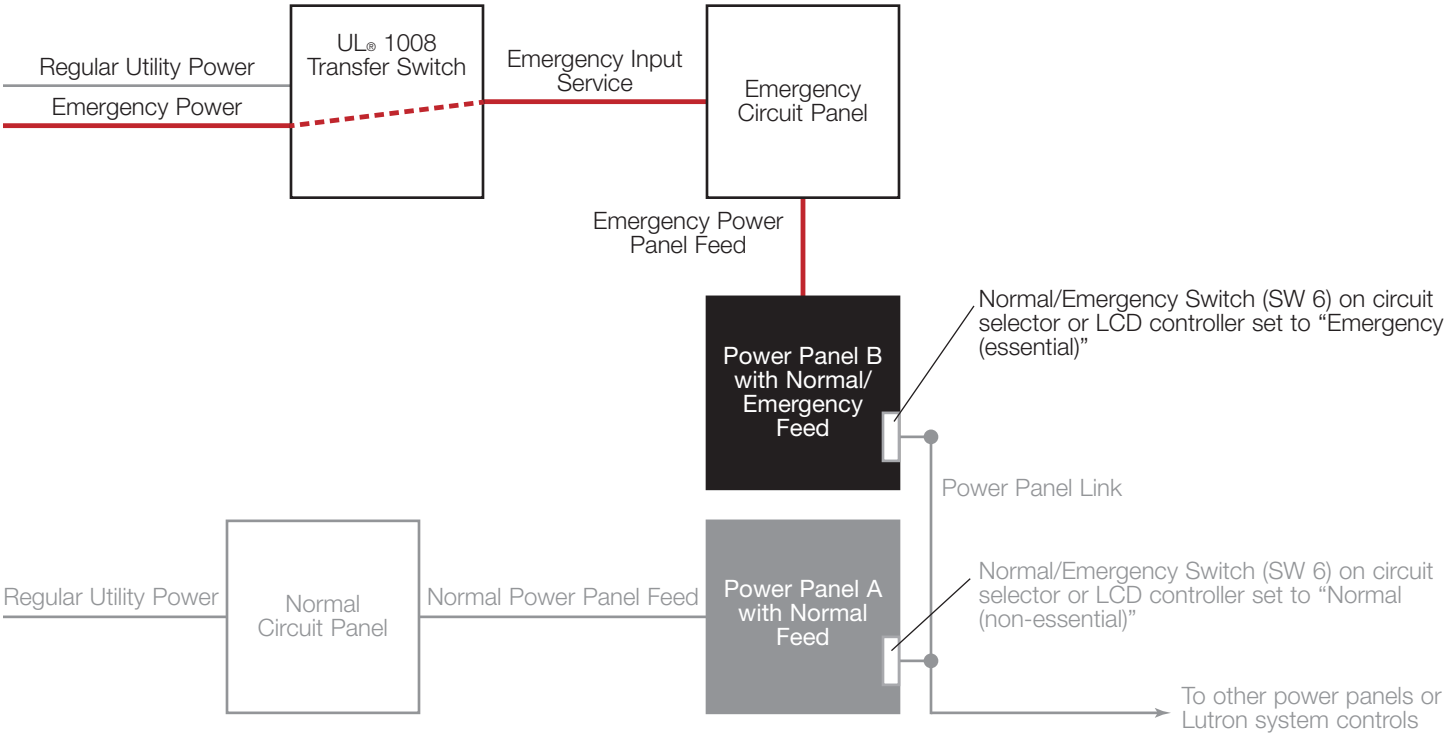
#### Powered by normal/emergency power and controlling an emergency load (continued)

#### Applications not requiring UL® 924 (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

## Quantum Systems

Quantum System is a Total Light Management system that incorporates building-wide control of both lights and shades. The expandability of Lutron commercial solutions, including GRAFIK Eye QS control units, Energi Savr Node units, and power panels, makes them ideal components for the Quantum system. Refer to the individual product sections for their uses in emergency lighting applications.

## Quantum EcoSystem Bus Supplies

### Powered by normal/emergency power and controlling and emergency load

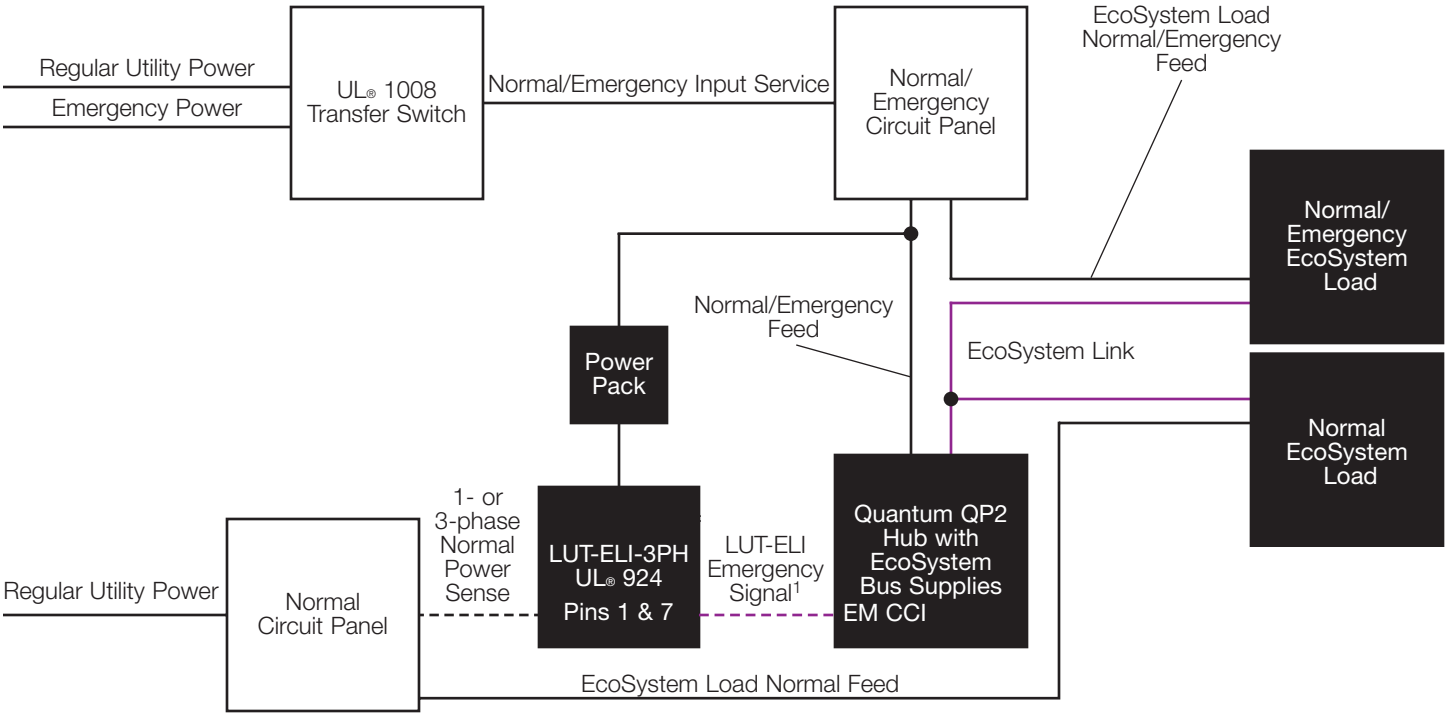
#### Using a LUT-ELI for UL® 924 applications

The LUT-ELI is listed under UL® 924 and, when used in a lighting system with Quantum EcoSystem Bus Supplies, equips the entire emergency lighting system to also meet UL® 924 standards. The LUT-ELI interfaces with the bus supplies through the emergency input located on the bus supply. When the LUT-ELI senses that any phase of normal power is lost, it sends all loads connected to the bus supplies to their emergency level after which system control will be locked out. When using this application, remember these key points:

- Although Quantum QP2 hubs can contain up to four bus supplies, because the emergency inputs are connected in parallel, the LUT-ELI will connect to only one of these bus supplies.
- A LUT-ELI cannot be connected to a QP3 hub or to a QP2 hub with zero bus supplies.
- The Quantum QP2 hub must be powered by normal/emergency power.
- EcoSystem ballasts that are part of the emergency lighting must be powered by normal/emergency power.
- The LUT-ELI must be powered by 24 V⎓ from a power pack (PP- model numbers) which must be wired to a normal/emergency line-voltage circuit.

Refer to the LUT-ELI and QP2 installation instructions for full wiring and programming instructions for this application.

**Wiring Schematic**




**Note**

[1] The LUT-ELI emergency signal will be wired to the EcoSystem bus supplies in the Quantum QP2 hub.

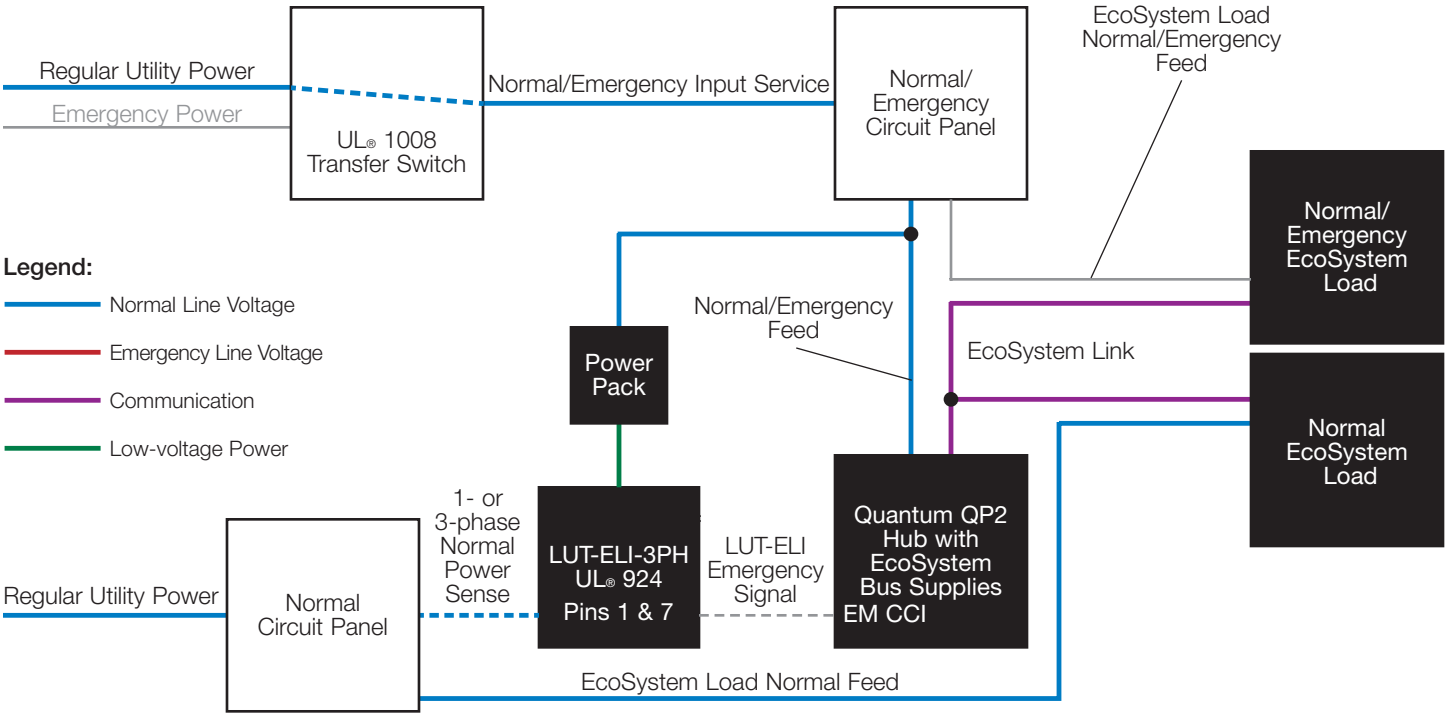
# Applications of Emergency Lighting with Lutron Systems (continued)

## Quantum EcoSystem Bus Supplies (continued)

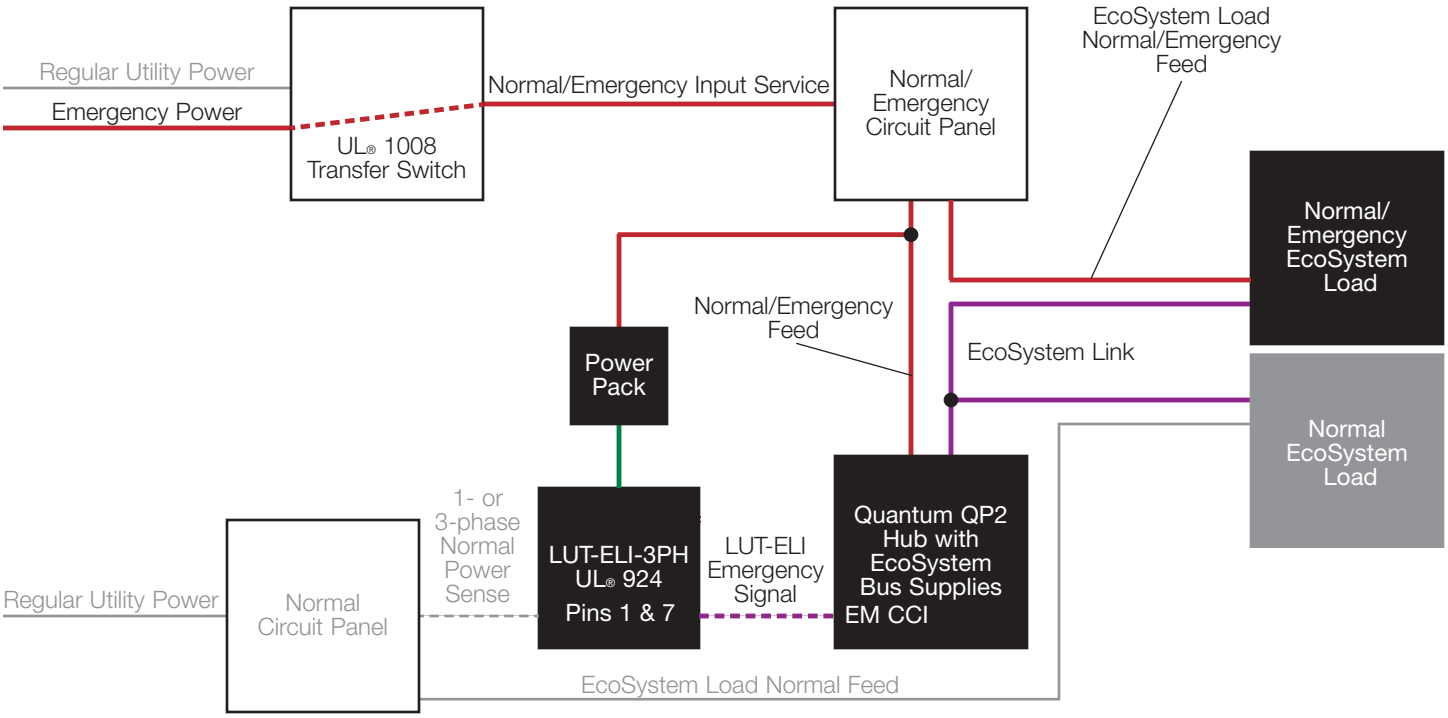
### Powered by normal/emergency power and controlling and emergency load (continued)

#### Using a LUT-ELI for UL® 924 applications (continued)

**Regular Operation**




**Emergency Operation**



## Applications of Emergency Lighting with Lutron Systems (continued)

### Athena System Controlling Clear Connect–Type X Loads as Emergency Loads

*This application only describes commercial Clear Connect–Type X fixtures used in an Athena system. This does not apply to HomeWorks Clear Connect–Type X or KetraNet fixtures (for emergency applications with KetraNet, see Lutron Application Note #730, P/N 048730, at www.lutron.com).*

This emergency application uses the LUT-ELI-3PH to monitor the loss of power from a 1-, 2- or 3-phase feed and will trigger the QP5-2L-POE-EM or Q-POE-PNL-EM ("emergency control panel") to power down the A-RF (Athena Wireless processors) or Q-RF (Athena Clear Connect – Type X gateways) (hereinafter "processors"). The emergency control panel will also trigger the per circuit shunts LUT-SHUNT-A-TD or LUT-SHUNT-A-TD-5 (hereinafter "circuit shunts") to interrupt power to their respective loads. The circuit shunts provide a fixed interruption of power that's intended to fully turn off Athena wireless nodes, Ketra, and Rania loads so they can turn back on and initiate their pre-programmed emergency settings. The emergency control panel's included PoE injectors, which power the processors, will turn off providing a lock out of controls.

Upon restoration of normal power, the processors will resume communication to the lighting loads, allowing them to return to regular operation after a period of time (timing depends on network conditions and size and may take several minutes to 30 or more minutes). The color temperature (if applicable) and light levels will return to their original state prior to entering emergency mode.

To meet the NFPA 101 guidelines and have the lighting loads function as both normal and emergency lighting load, this application will require the following:

- An emergency control panel
  - The emergency control panel must power the processors that are associated with all emergency CCX loads using the included PoE Injectors (L-POEI-BL).
  - A processor must be wired directly to the emergency control panel with no network equipment between the processors and the emergency control panel.
- A LUT-ELI-3PH must monitor normal power and be wired as shown on the next page.
- All fixtures using Athena wireless nodes programmed as Emergency require a five (5) second power interruption (provided by a required per circuit LUT-SHUNT-A-TD-5 shunt) to ensure the Athena wireless node power cycles upon loss of normal power and activates their pre-programmed emergency color temperature (when applicable) and light level intensity.
  - Some devices powering the Athena wireless node directly may not meet this requirement in all applications and will require a DFC-OEM-DBI to power the Athena wireless node. Testing in advance of installation is required.
  - The Athena wireless nodes require a minimal firmware to support the emergency function, this will be done by your service technician at startup.
- All CCX Ketra and Rania loads programmed as emergency loads require 2.5 seconds of power interruption (provided by a required per circuit LUT-SHUNT-A-TD shunt) to activate their emergency mode and go to their pre-programmed emergency lighting level upon loss of normal power.
  - From the loss of normal power to the emergency power being available to the fixture must be less than 6 seconds.

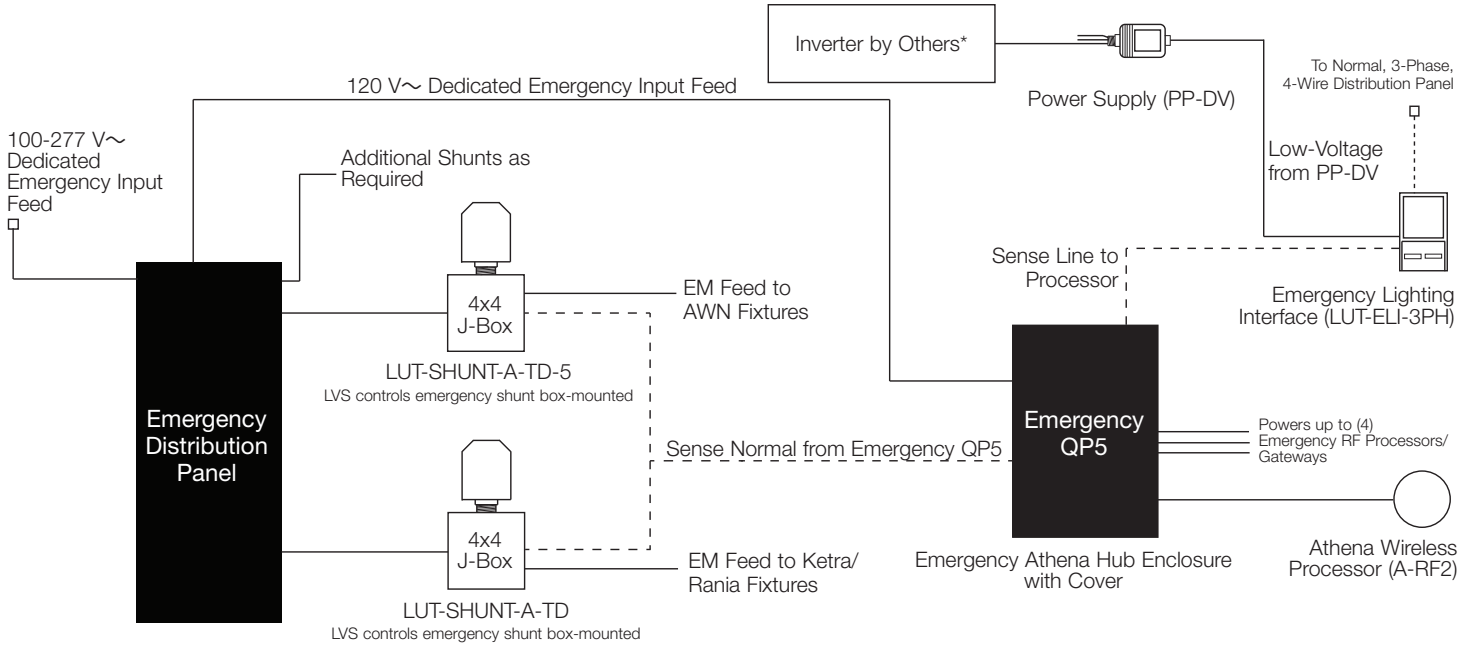
**Important Notes**

- Ketra, Rania, and Athena wireless node fixtures may not share the same SHUNT device.
- PoE wire length limits must be followed.
- LUT-ELI-3PH cannot lose power during transfer from normal to emergency. If the emergency power source is a UPS, and thus will not experience a dropout of power between utility and inverter power, no additional inverter on the LUT-ELI-3PH is required.

# Applications of Emergency Lighting with Lutron Systems (continued)

## Athena System Controlling Ketra Loads as Emergency Loads (continued)

### Wiring Schematic Ketra and Athena Wireless Node Fixtures




Typical for Each Emergency Circuit Feeding CCX Enabled Fixtures

Typical for 1-4 Emergency Wireless Processors (A-RF2, Q-RF)

For point-to-point wiring, refer to the specification submittal for the QP5-2L-POE-EM (P/N 3691148) on www.lutron.com.

The following Clear Connect-Type X Ketra loads have been evaluated by UL for use in emergency lighting systems in accordance with standard UL924 and CSA C22.2 No. 141 when paired with the LVS™ model LUT-SHUNT-A-TD (UL® file E206507).

CM-A20XXXGTXXXXXXXXX
CM-S38XXGTXXXXXXXXX
CM-TAS38XXGTXXXXXXXXXXXXXXX
CM-D3XXXXXXGTXXXXXXXXXX
CM-L4RXXXXXXXXXXXXXXXXXXX
CM-G2XXXXXXXXXXXX
CM-LS0XXXXXXXX
CM-S30XXGTXXXXXXXXX
CM-TAS30XXGTXXXXXXXXXXXXXXX
CM-D4RXXXXXXXXGTXXXXXXXXXXXX
CM-N3LTXXXXXXX
CM-L3IXXXXXXXXXXXXXXXXXXX
CM-D2XXXXXXXXXXXXXXX
CM-X96-X-J2

The Athena wireless node has been evaluated by UL for use in emergency lighting systems in accordance with standard UL924 and CSA C22.2 No. 141 when paired with the LVS™ model LUT-SHUNT-A-TD-5 and the QP5-2L-POE-EM or Q-POE-PNL-EM.

* Only required if emergency power source is a generator. Lutron recommends the LUT-LUV-2 provided by LVS Controls.

# Applications of Emergency Lighting with Lutron Systems (continued)

## DMX Output Devices

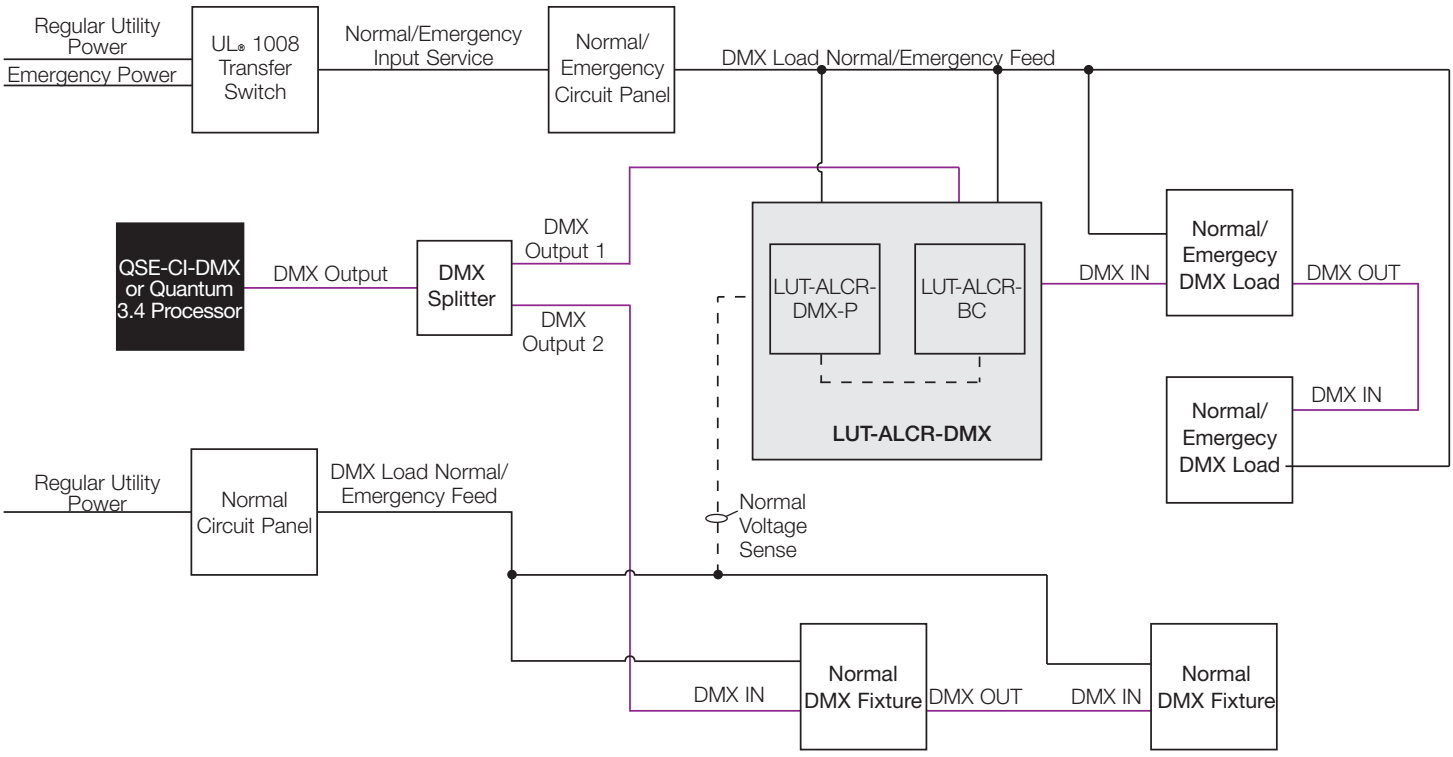
### Powered by normal/emergency power and controlling an emergency load

#### Using an ALCR to control normal/emergency DMX fixtures

During regular operation, normal power is present and the normal/emergency DMX loads can be controlled by the DMX output device. When the ALCR senses that any phase of normal power is lost, it recalls a recorded emergency scene and sends it to all loads connected to the output of the ALCR. Examples of a DMX ALCR is LUT-ALCR-DMX from LVS Controls. This device can be used with Lutron products, which include:

- QSE-CI-DMX
- Quantum Processor (version 3.4 only)

**Wiring Schematic**



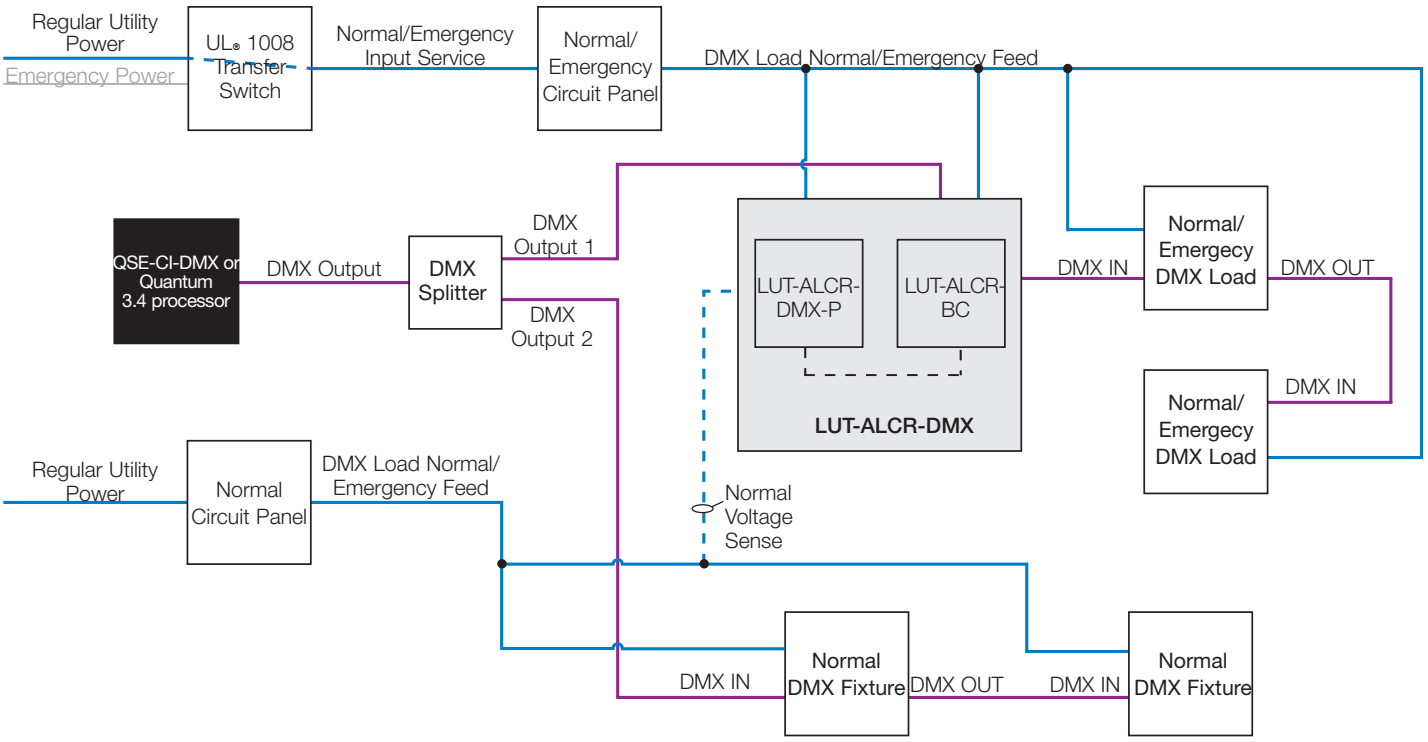
# Applications of Emergency Lighting with Lutron Systems (continued)

## DMX Output Devices (continued)

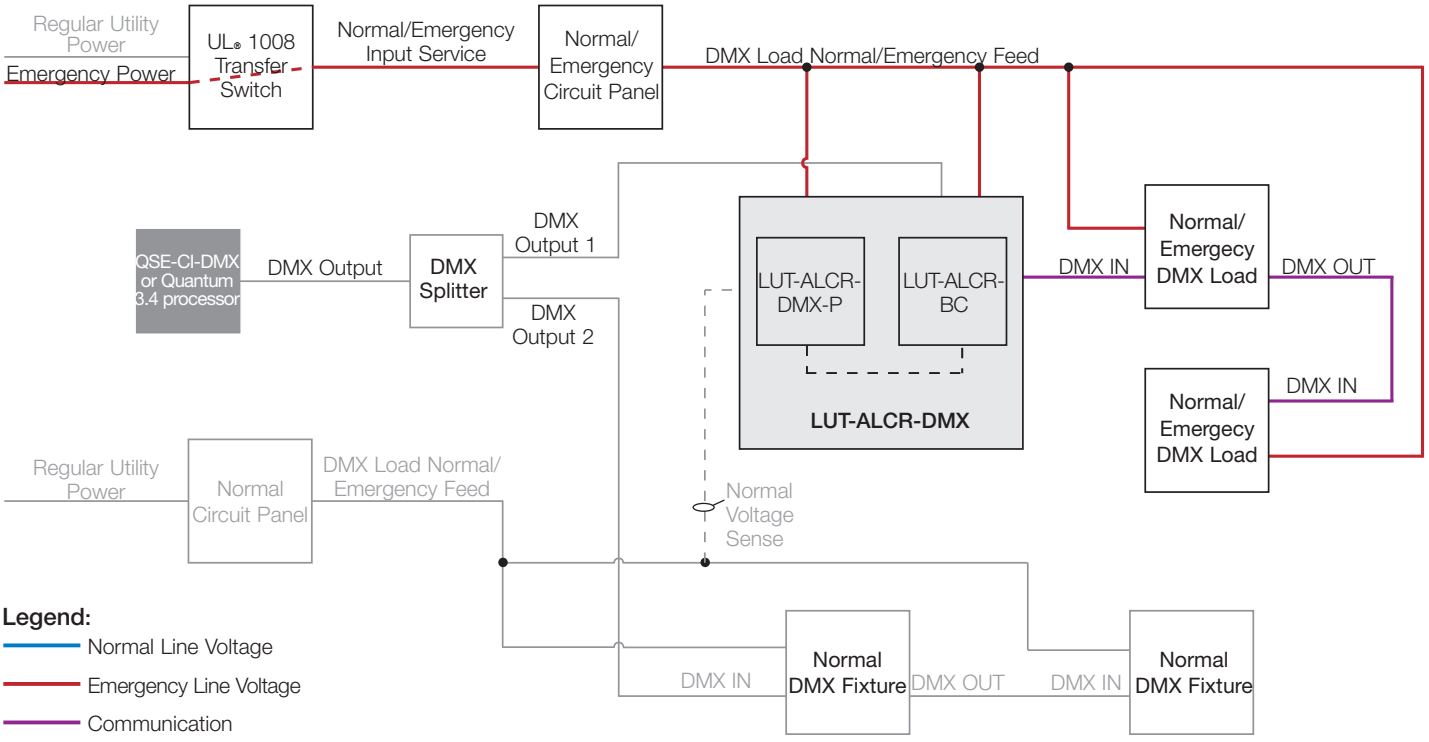
### Powered by normal/emergency power and controlling an emergency load (continued)

#### Using an ALCR to control normal/emergency DMX fixtures (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

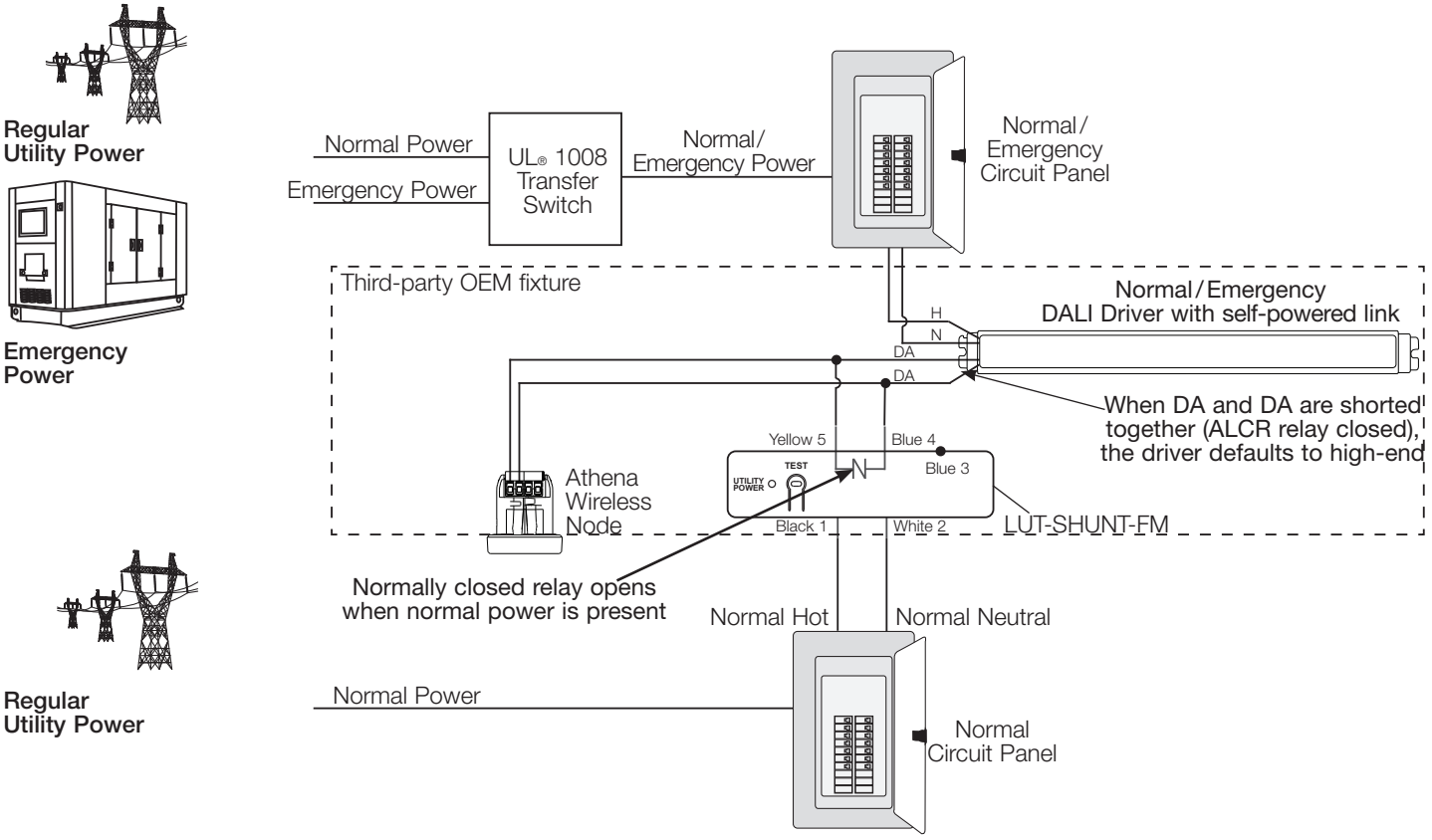
## Athena Wireless Node and DALI Driver with Self-Powered Link

### Powered by normal and emergency power and controlling an emergency load

In applications where an Athena wireless node is used with a DALI driver, an ALCR is used with a normally closed relay. During regular operation the normally closed relay is held open allowing the Athena wireless node to control the load. During emergency operation, the normally closed relay closes and shorts the DA and DA terminals, resulting in the load going to high-end. Some examples of ALCRs like this are the LUT-SHUNT-FM or the RRU-UNV-FM from LVS controls. This applies to **A-WN-D01-RF**.

**Note:** LUT-SHUNT-FM is intended to be installed at the factory of an OEM fixture manufacturer.

**Wiring Schematic**

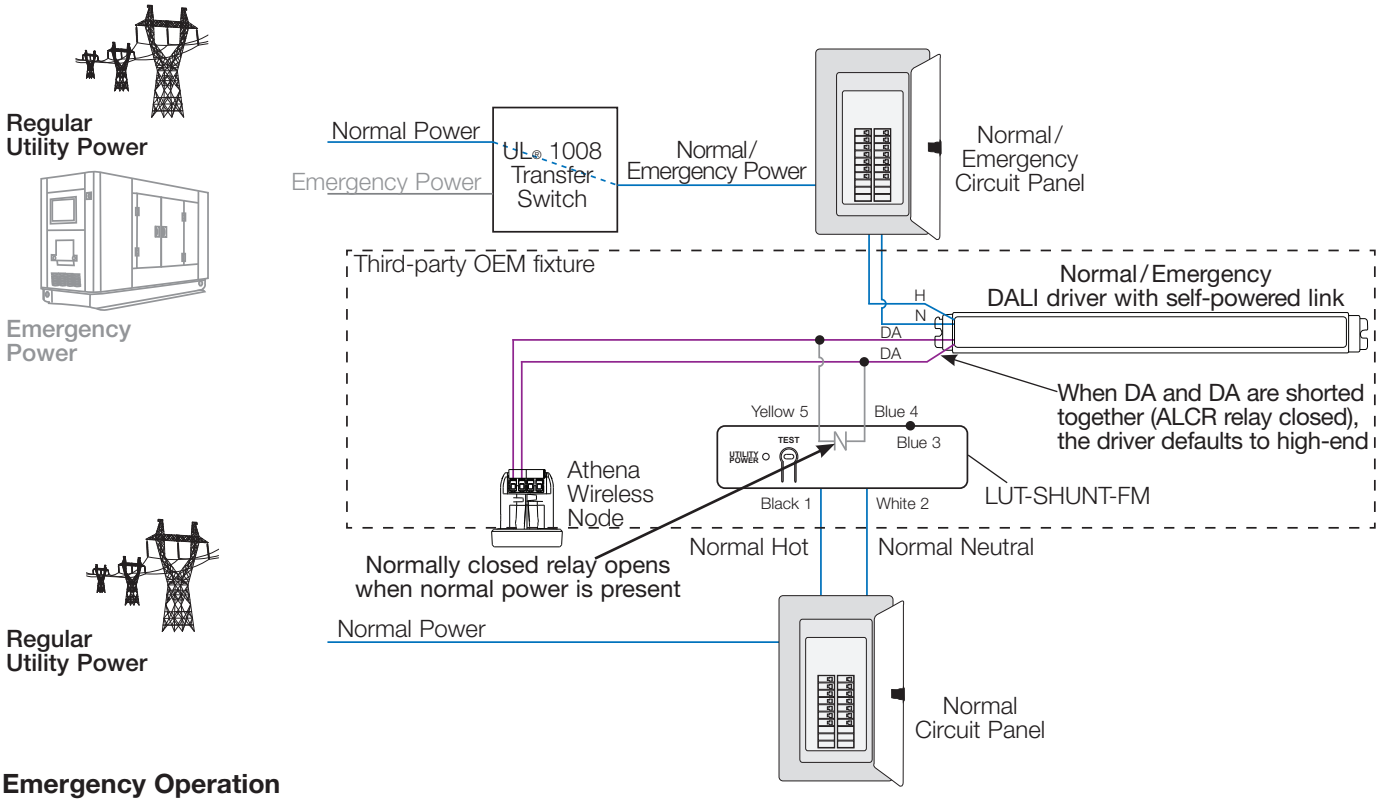


# Applications of Emergency Lighting with Lutron Systems (continued)

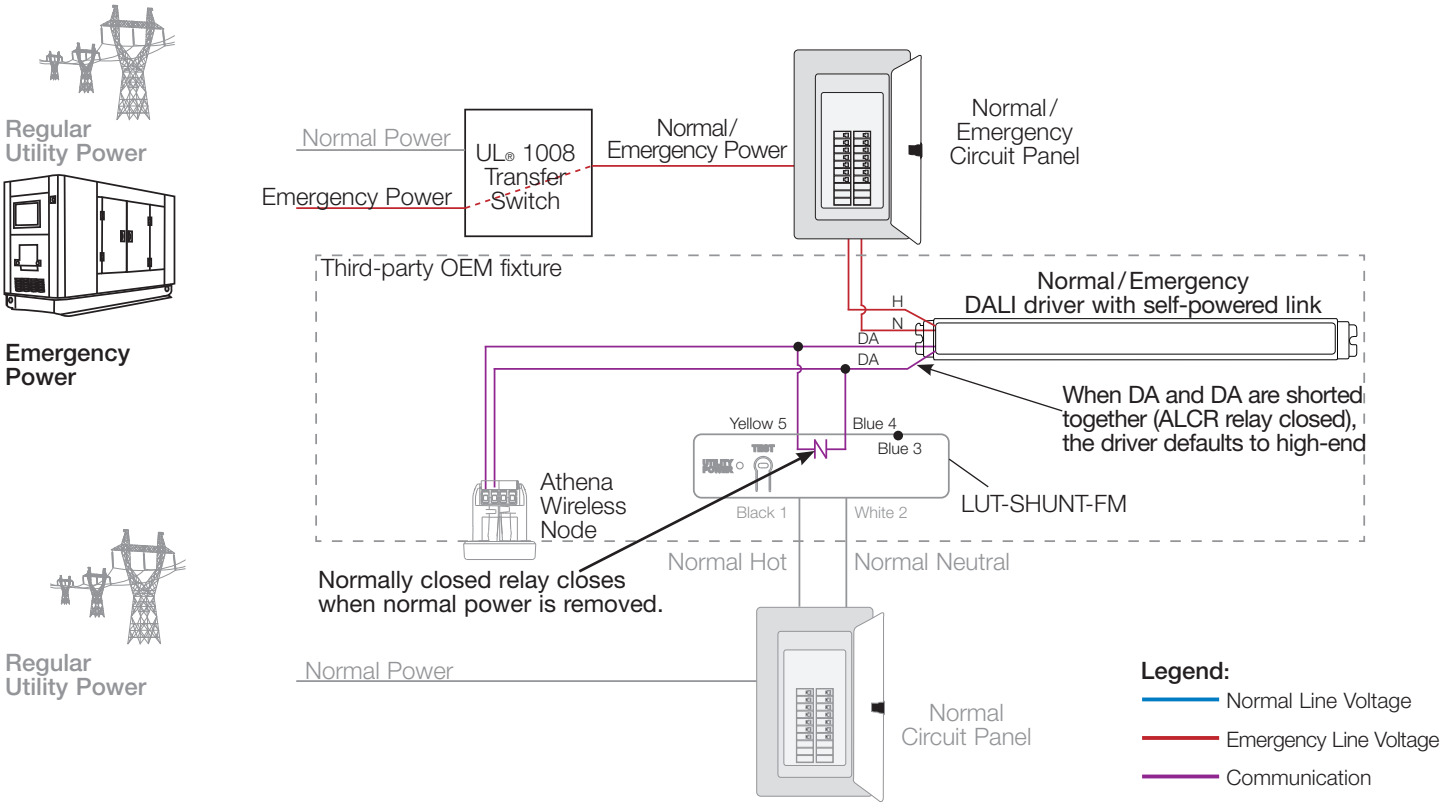
## Athena Wireless Node and DALI Driver with Self-Powered Link (continued)

### Powered by normal and emergency power and controlling an emergency load (continued)

**Regular Operation**




**Emergency Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

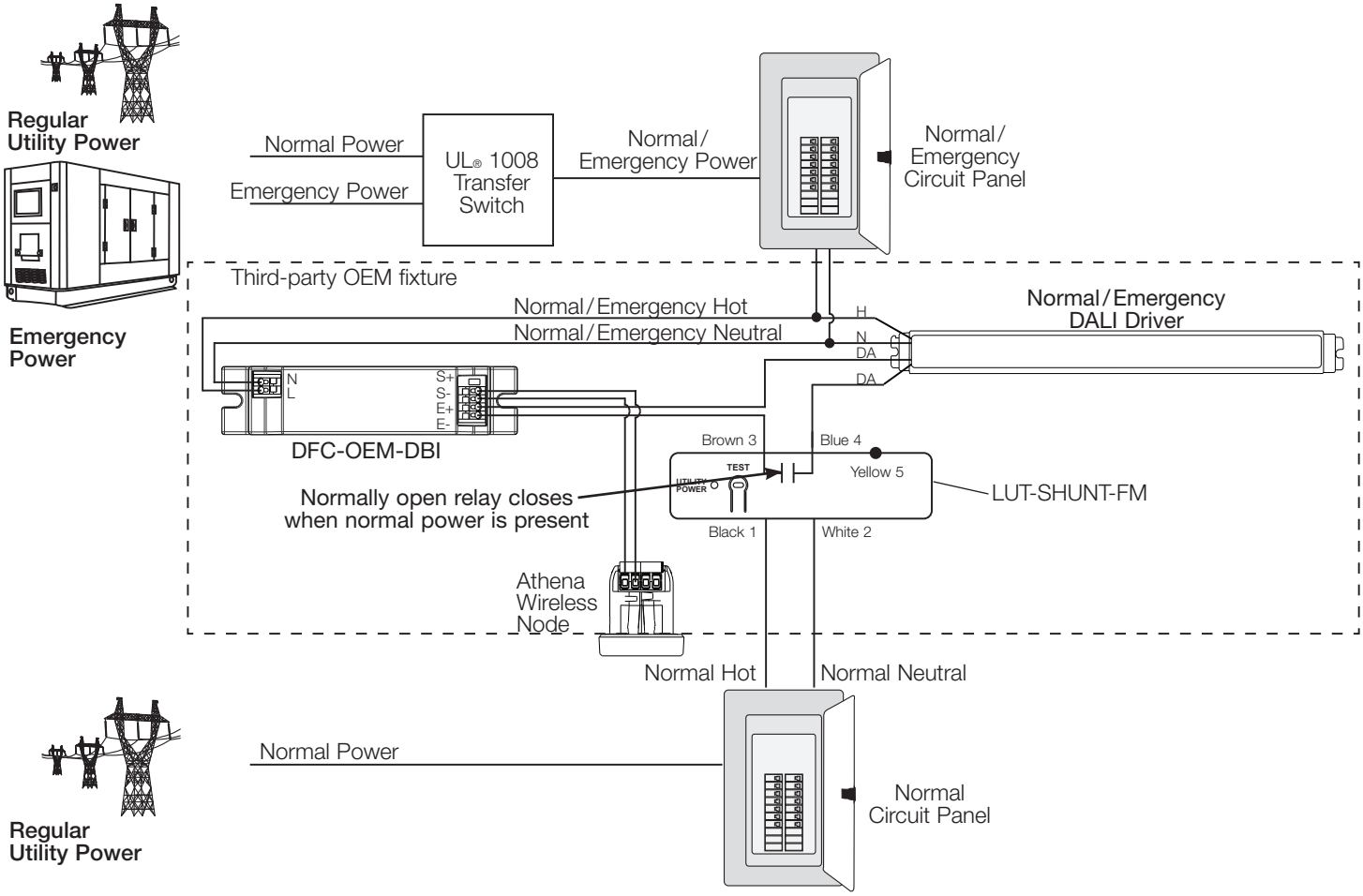
## Athena Wireless Node and DALI Driver without Self-Powered Link

### Powered by normal and emergency power and controlling an emergency load

In applications where an Athena wireless node is used with a DALI driver and a DFC-OEM-DBI to power the Athena wireless node, an ALCR is used with a normally open relay. During regular operation the normally open relay is closed allowing the Athena wireless node to control the load. During emergency operation, the normally open relay opens, breaking the communication to the load, resulting in the load going to high-end. Some examples of ALCRs like this are the LUT-SHUNT-FM or the RRU-UNV-FM from LVS controls. This applies to **A-WN-D01-RF with DFC-OEM-DBI**.

**Note:** LUT-SHUNT-FM is intended to be installed at the factory of an OEM fixture manufacturer.

**Wiring Schematic**

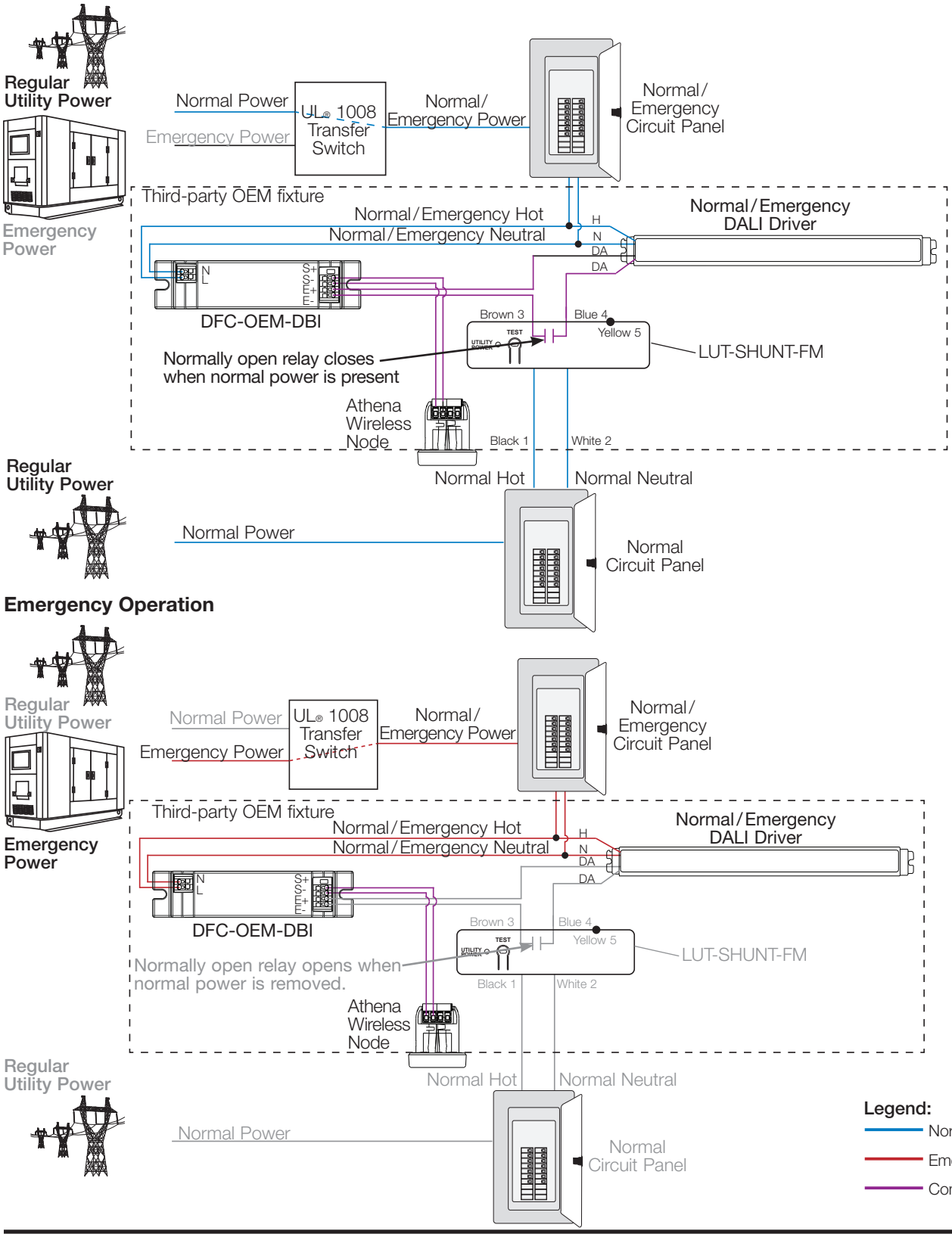


# Applications of Emergency Lighting with Lutron Systems (continued)

## Athena Wireless Node and DALI Driver without Self-Powered Link (continued)

### Powered by normal and emergency power and controlling an emergency load (continued)

**Regular Operation**



# Applications of Emergency Lighting with Lutron Systems (continued)

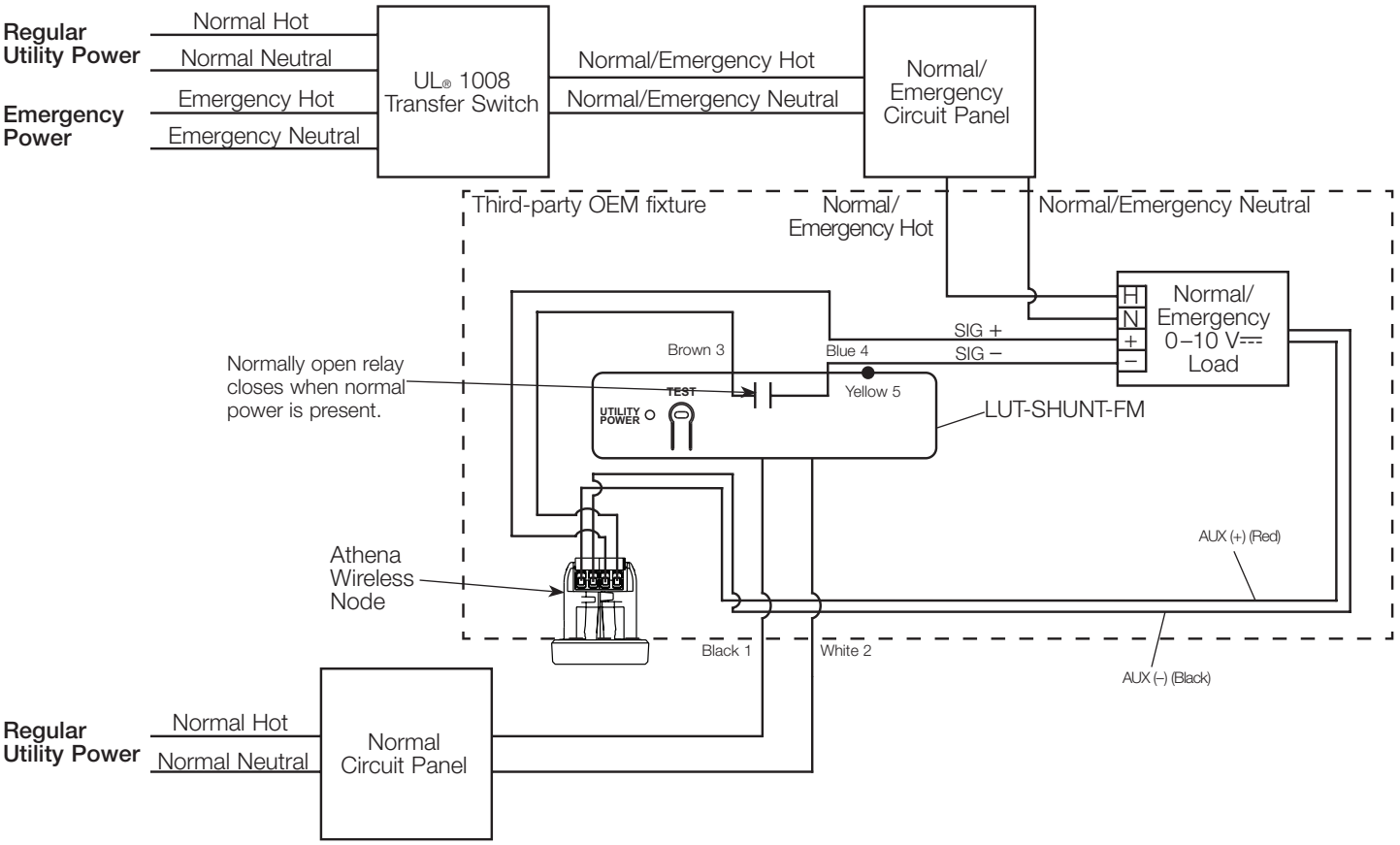
## Athena Wireless Node and 0-10 V⎓ Driver with Built-In Aux Supply

### Powered by normal and emergency power and controlling an emergency load

In applications where an Athena wireless node is used with a 0-10 V⎓ driver, a LUT-SHUNT-FM is used to open the 0-10 V⎓ signal during emergency operation. This prevents the Athena wireless node from controlling light output, resulting in the light output going to high-end.

**Note:** LUT-SHUNT-FM is intended to be installed at the factory of an OEM fixture manufacturer.

**Wiring Schematic**

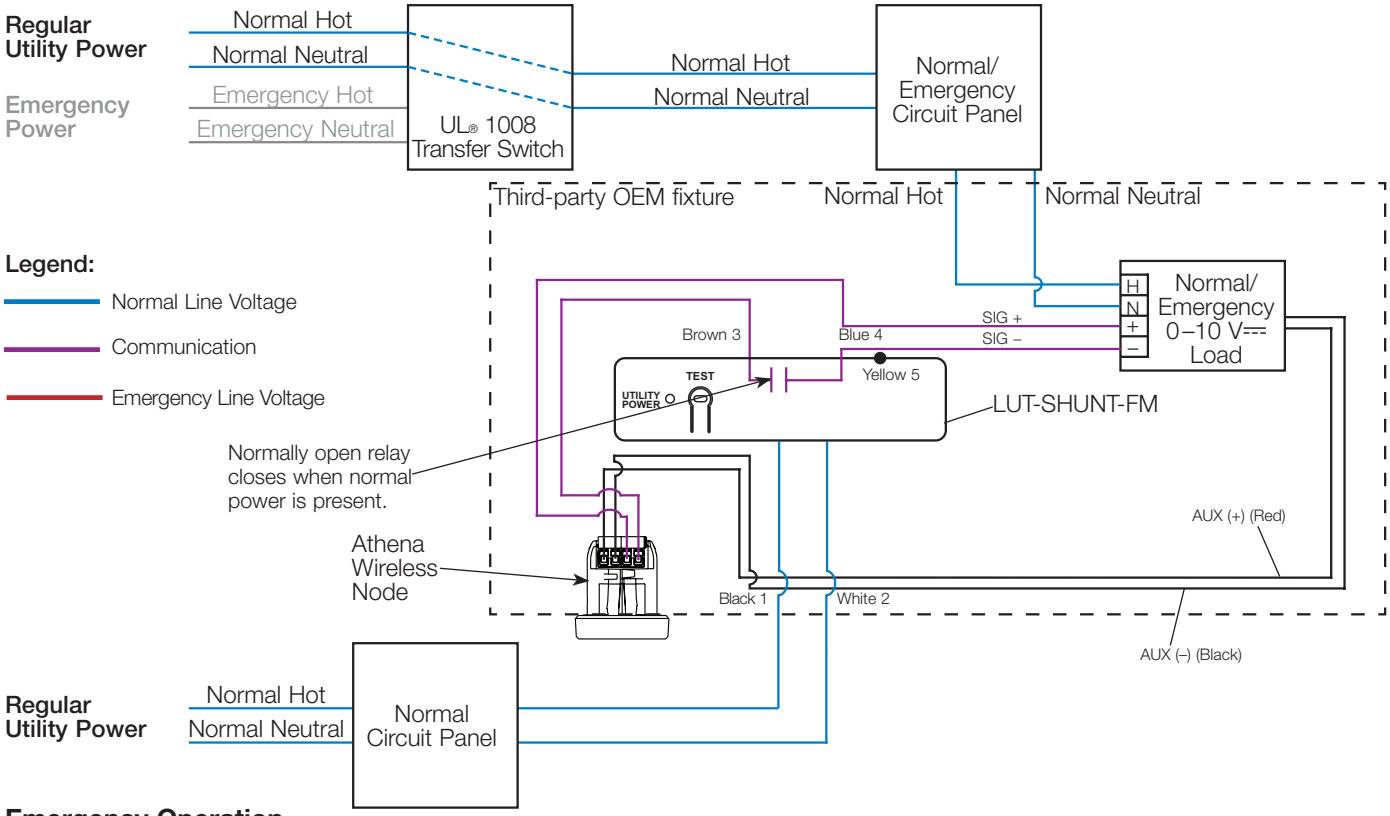


# Applications of Emergency Lighting with Lutron Systems (continued)

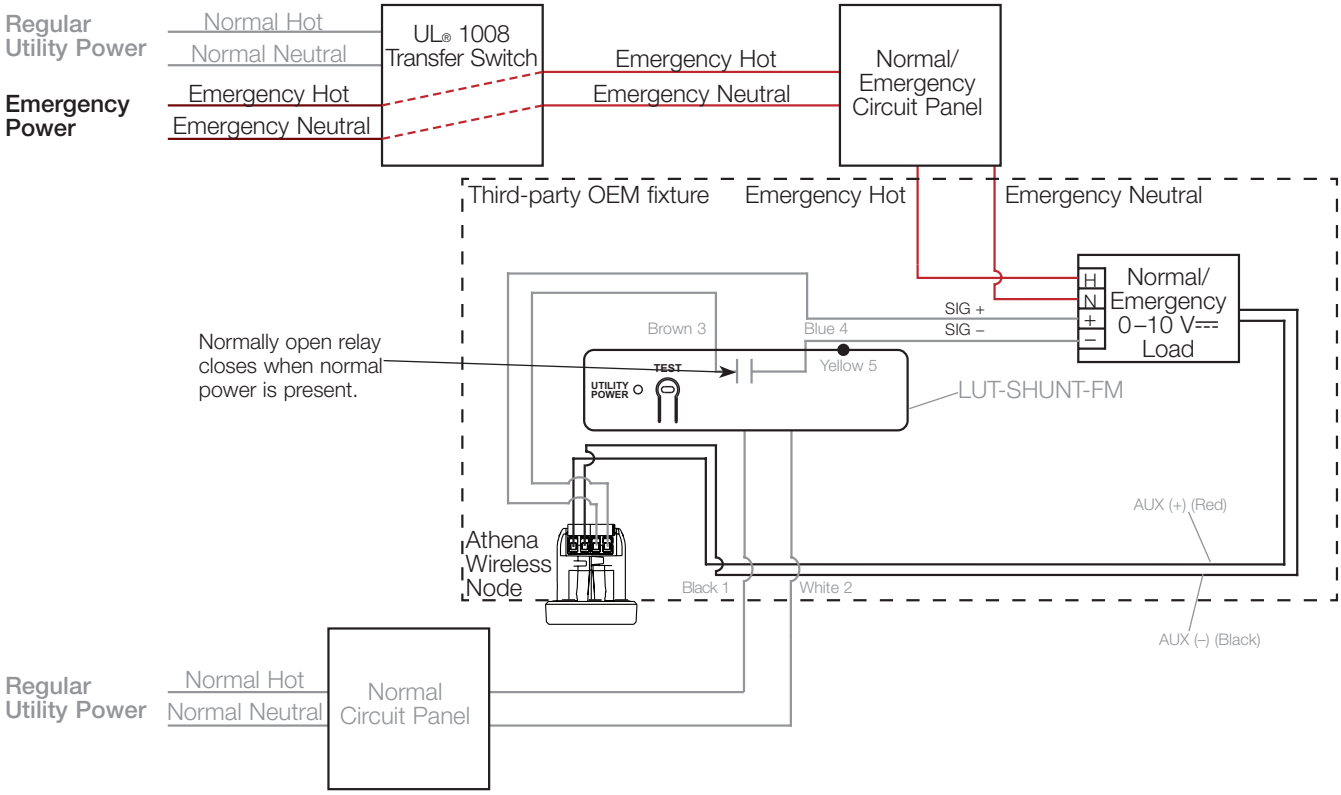
## Athena Wireless Node and 0-10 V⎓ Driver with Built-In Aux Supply (continued)

### Powered by normal and emergency power and controlling an emergency load (continued)

#### Regular Operation




#### Emergency Operation



# Applications of Emergency Lighting with Lutron Systems (continued)

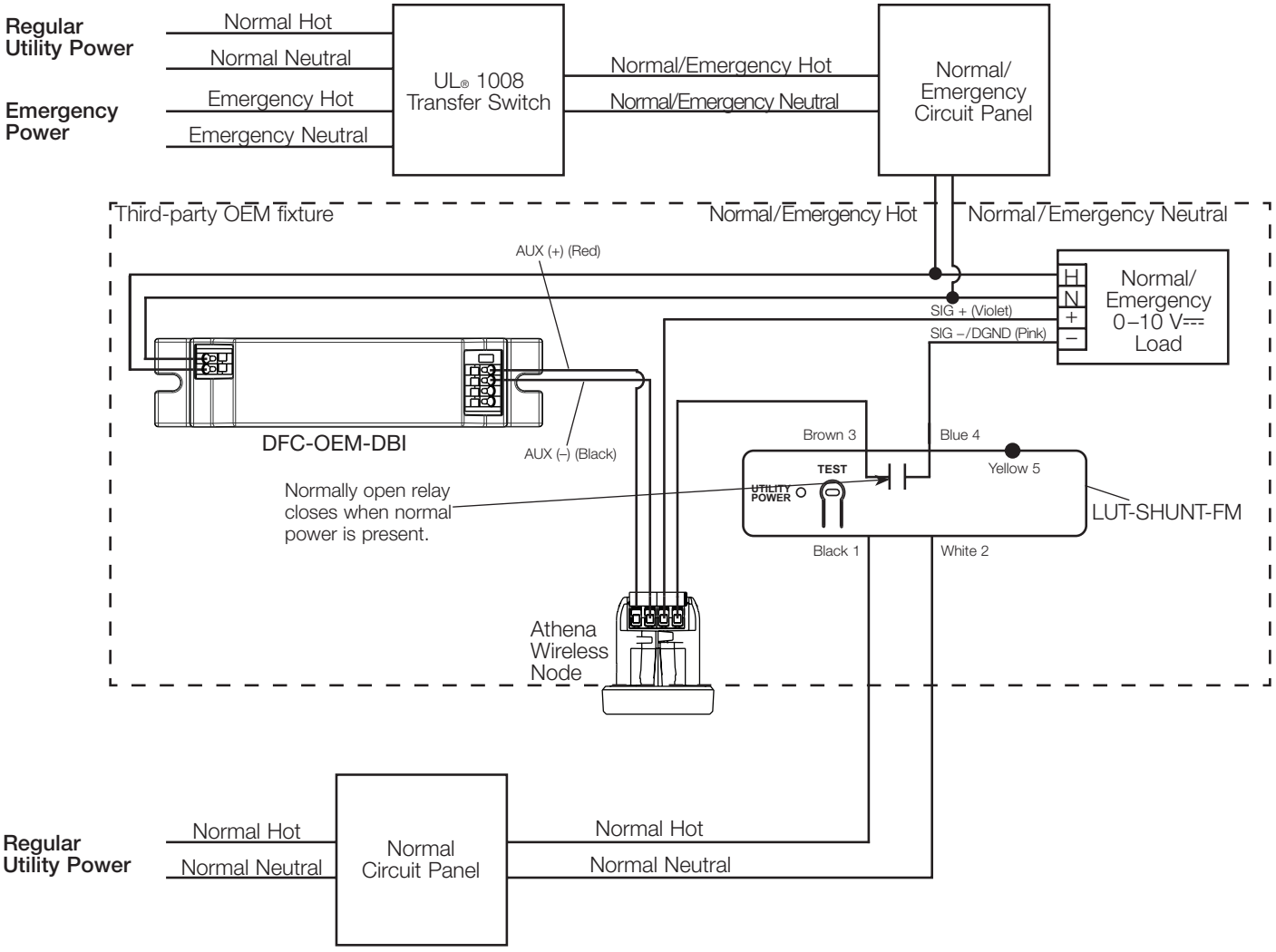
## Athena Wireless Node and 0-10 V⎓ Driver without Built-In Aux Supply

### Powered by normal and emergency power and controlling an emergency load

In applications where an Athena wireless node is used with a 0-10 V⎓ driver and a DFC-OEM-DBI to power the Athena wireless node, a LUT-SHUNT-FM is used to open the 0-10 V⎓ signal during emergency operation. This prevents the Athena wireless node from controlling light output, resulting in the light output going to high-end.

**Note:** LUT-SHUNT-FM is intended to be installed at the factory of an OEM fixture manufacturer.

**Wiring Schematic**

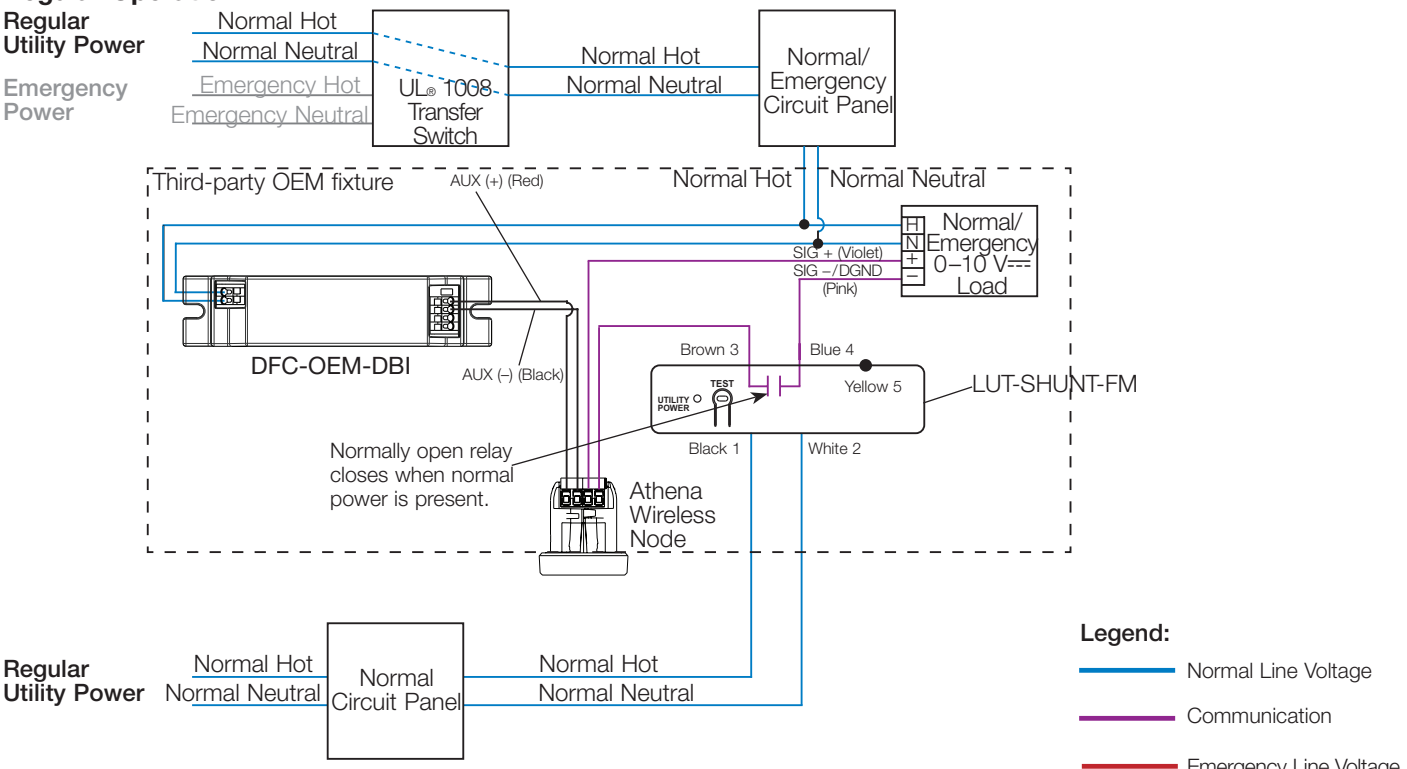


# Applications of Emergency Lighting with Lutron Systems (continued)

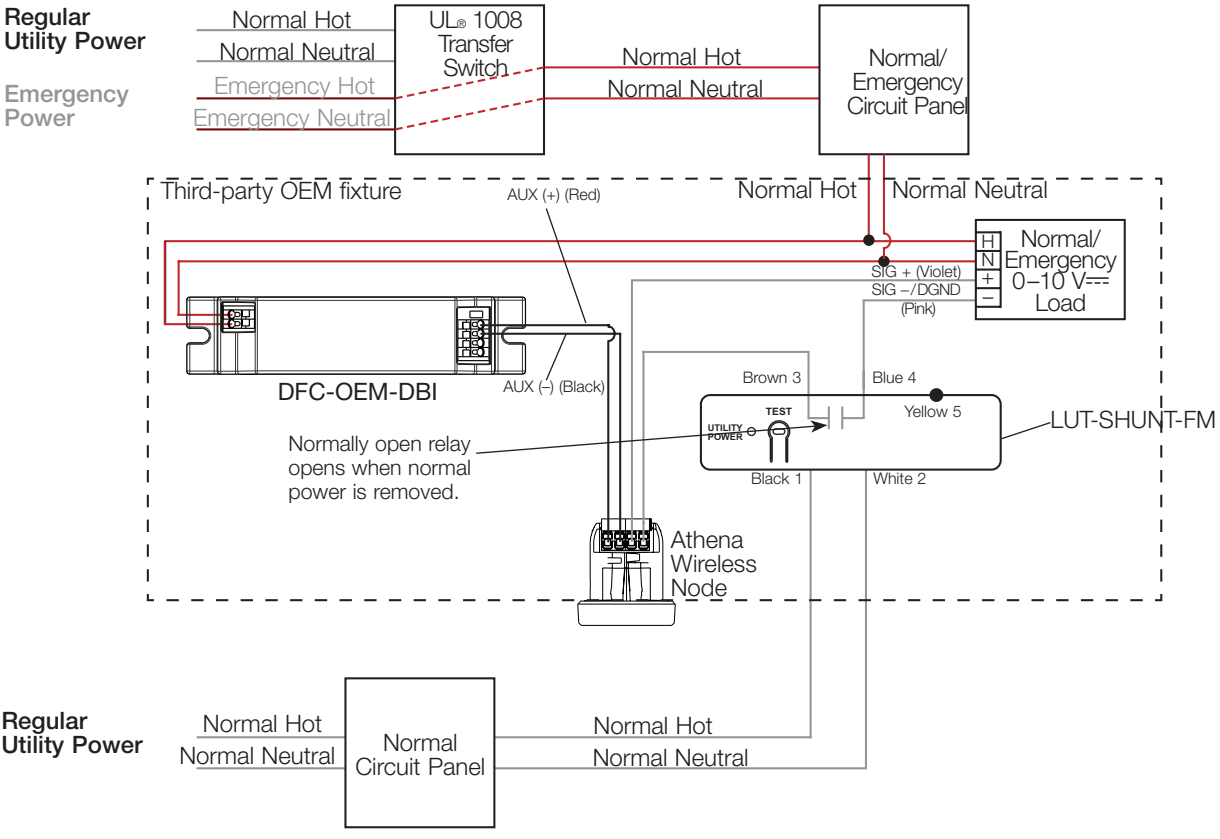
## Athena Wireless Node and 0-10 V⎓ Driver without Built-In Aux Supply (continued)

### Powered by normal and emergency power and controlling an emergency load (continued)

**Regular Operation**




**Emergency Operation**



## Programming Emergency Light Levels

Many Lutron lighting control systems can achieve emergency lighting requirements without using third-party devices (e.g., ALCRs, battery backup ballasts). When designing an emergency lighting system, it may not be necessary to force all lighting to 100%, which can help to reduce the load on a backup power source (e.g., a generator). The table below shows which systems have programmable emergency light levels and the methods for programming them. This programming is available only when not using third-party emergency devices, which typically force all connected lighting to 100%.

| Product | System | Emergency Level | How to Program |
|---|---|---|---|
| EcoSystem PowPak unit | Energi TriPak | 100% | Not Programmable |
| GRAFIK Eye QS control unit (all models) | QS Standalone | 100% | Not Programmable |
| GRAFIK Eye QS control unit | Quantum | High-end trim | Not Programmable |
| Energi Savr Node with Softswitch unit | QS Standalone | Off, On | User Interface on Energi Savr Node unit or Energi Savr Node Hand-Held Device |
| Energi Savr Node with Softswitch unit | Quantum | Off, On | Quantum Q-Design Software |
| Energi Savr Node with Softswitch unit | Athena | Off, On | Athena Designer Software |
| Energi Savr Node for 0–10 V⎓ unit | QS Standalone | 0 - 100% | User Interface on Energi Savr Node unit or Energi Savr Node Hand-Held Device |
| Energi Savr Node for 0–10 V⎓ unit | Quantum | 0 - 100% | Quantum Q-Design Software |
| Energi Savr Node for 0–10 V⎓ unit | Athena | 0 - 100% | Athena Designer Software |
| Energi Savr Node PRO LED+ phase adaptive unit | QS Standalone | 0 - 100% | Energi Savr Node Hand-Held Device |
| Energi Savr Node PRO LED+ phase adaptive unit | Athena | 0 - 100% | Athena Designer Software |
| Energi Savr Node PRO LED+ phase adaptive unit | Quantum | 0 - 100% | Quantum Q-Design Software |
| Energi Savr Node with EcoSystem unit | QS Standalone | 0 - 100% unaffected | Energi Savr Node Hand-Held Device |
| Energi Savr Node with EcoSystem unit | Quantum | 0 - 100% | Quantum Q-Design Software |
| Energi Savr Node with EcoSystem unit | Athena | 0 - 100% | Athena Designer Software |
| Power panel | GRAFIK 4000 | 0 - High-end trim | Circuit Selector |
| Power panel | XPS | Off, On unaffected | LCD Controller |
| Power panel | LCP 128 | 0 - High-end trim unaffected | LCD Controller |
| Power panel | Quantum | 0 - 100% | Quantum Q-Design Software |
| Quantum bus supply | Quantum | 0 - High-end trim | Quantum Q-Design Software |
| T-Series Energi Savr Node | Quantum | Intensity: 0 - 100%<br>Color: minimum CCT - maximum CCT | Quantum Q-Design Software |
| T-Series Energi Savr Node | Athena | Intensity: 0 - 100%<br>Color: minimum CCT - maximum CCT | Athena Designer Software |
| Ketra | Athena | Intensity: 0 - 100%<br>Color: minimum CCT - maximum CCT | Athena Designer Software |

## Frequently Asked Questions

Below are several Frequently Asked Questions (FAQ) regarding unique applications and design rules for designing emergency lighting systems using the LUT-ELI and Lutron lighting control systems.

***FAQ 1:*** *How many LUT-ELI devices will I need?*

***A:*** The LUT-ELI is used to sense the presence of normal power and signal connected Lutron equipment when normal power has been lost. The number of LUT-ELI devices required depends on the number of different sources of power or distribution panels that need to be monitored. For example, 120/277 V~ load controls on the same floor may have one distribution panel for power panel loads and a separate panel for EcoSystem loads, both of which need to be individually monitored. One LUT-ELI per monitored source is recommended.

Another consideration is the sequence of operations for emergency lighting. In a multi-story or multi-tenant building, it may be desirable to monitor normal power floor-by-floor or area-by-area instead of monitoring the entire building as a single area. A common application for this scenario is to install one LUT-ELI per floor. Although this will require more LUT-ELIs, it will assure a more focused power sensing approach.

***FAQ 2:*** *Can I share the LUT-ELI with multiple devices? How many?*

***A:*** The LUT-ELI can be used with these Lutron products:

- Power panels
- Quantum panel with EcoSystem bus supplies
- GRAFIK Eye QS
- Energi Savr Node
- Athena DIN panel switching, 0-10 V⎓, PRO LED+ Phase Adaptive, and DALI Universal modules

The LUT-ELI signal can be shared with any combination of up to 32 of these devices. When sharing the LUT-ELI signal, keep these points in mind:

- A Quantum QP2 Hub can contain anywhere from 0 to 4 EcoSystem Bus Supplies. Each bus supply would count toward the 32-device limit.
- The LUT-ELI communicates to the circuit selector or LCD controller in a power panel. Larger power panels may contain multiple circuit selectors or LCD controllers, each of which count toward the 32-device limit.
- It is recommended that one LUT-ELI be used for every source of power or distribution panel that needs to be monitored. If the LUT-ELI is shared among multiple devices being fed from different power sources, then proper emergency lighting requirements may not be satisfied. For example, an area that contains both 120 V~ and 277 V~ emergency lighting should use two LUT-ELIs, one to monitor each source. Sharing one LUT-ELI between the 120 V~ and 277 V~ devices may not satisfy emergency lighting requirements.

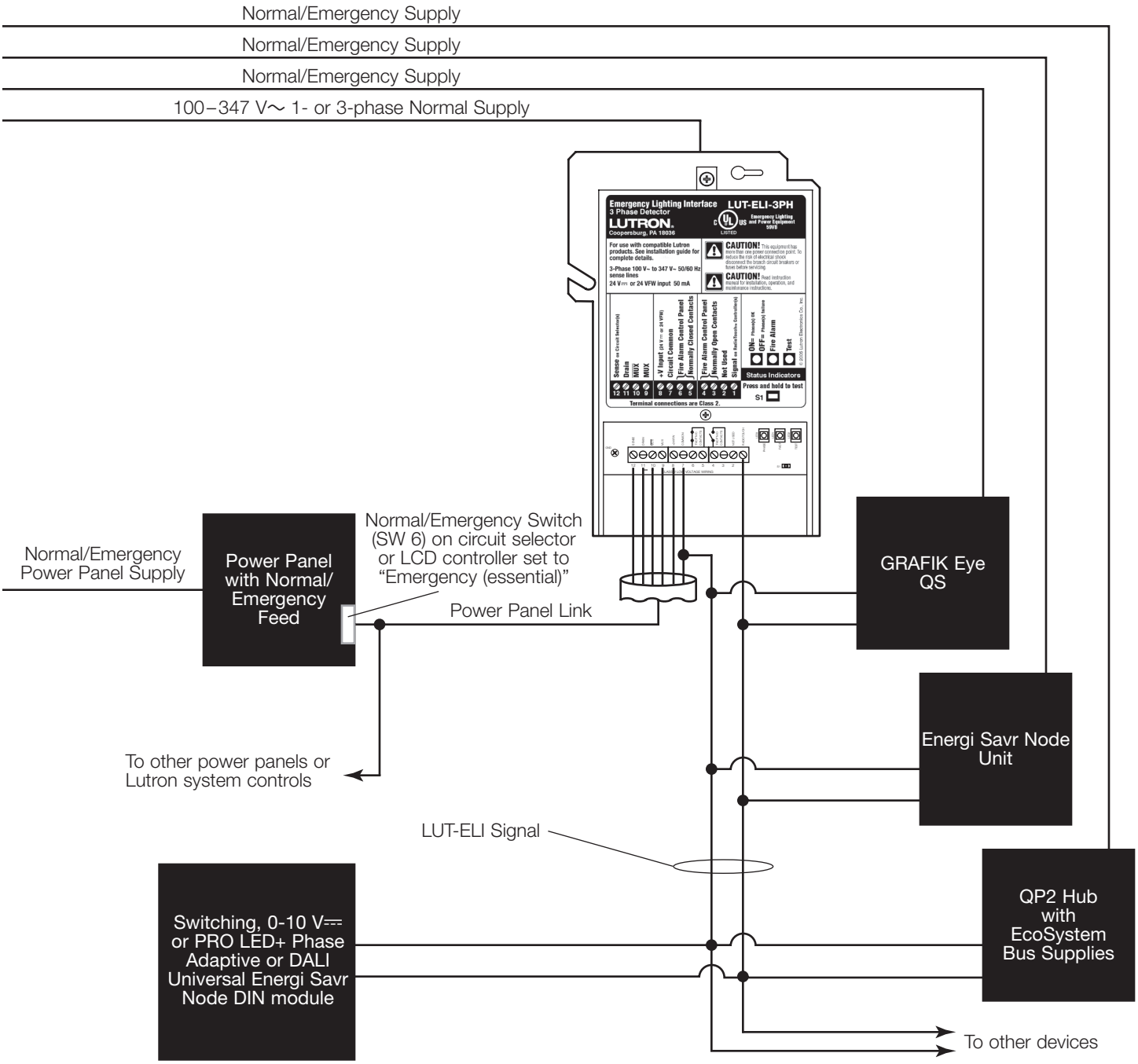
## Frequently Asked Questions (continued)

***FAQ 3:*** *I'm sharing a LUT-ELI with multiple devices. How does this wire together? Will I need a power pack?*

***A:*** First, refer to *FAQ 2* to ensure that the LUT-ELI signal is being shared properly. The LUT-ELI requires 24 V⎓ power to operate. This 24 V⎓ can come from either a power pack, a GRAFIK Eye QS, or from the power panel link. The three scenarios illustrated below show how the LUT-ELI is shared among multiple devices and whether a power pack is required.

**Sharing the LUT-ELI Among Multiple Devices**

***Sharing when power panels are included***



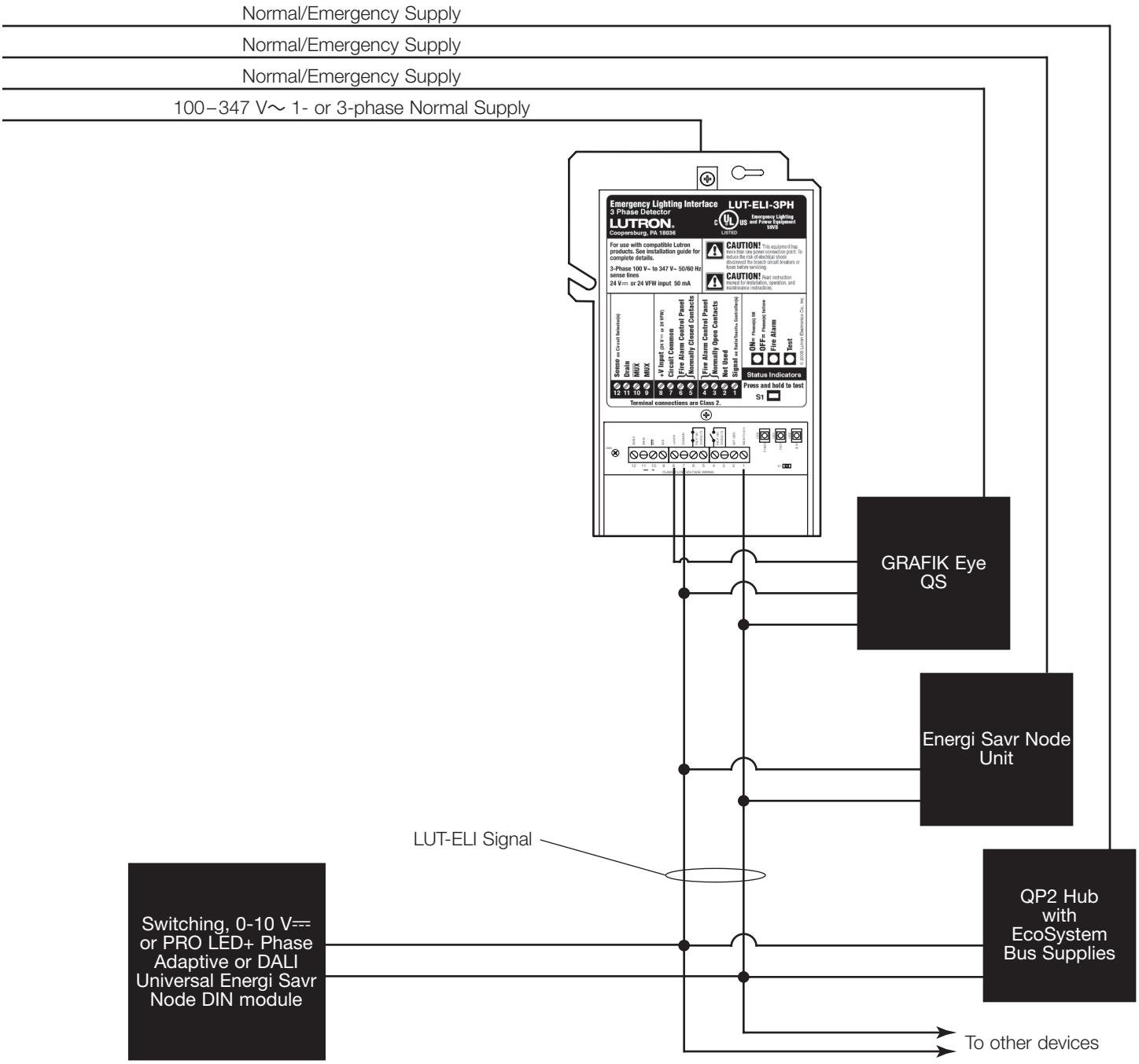
## Frequently Asked Questions (continued)

***FAQ 3:*** (continued)

***A:*** (continued)

**Sharing the LUT-ELI Among Multiple Devices** (continued)

***Sharing when a GRAFIK Eye QS is included and Power Panels are not included***




**Note**

When multiple GRAFIK Eye QS devices are used, the required +24 VFW connection to the LUT-ELI is necessary from only one GRAFIK Eye QS device.

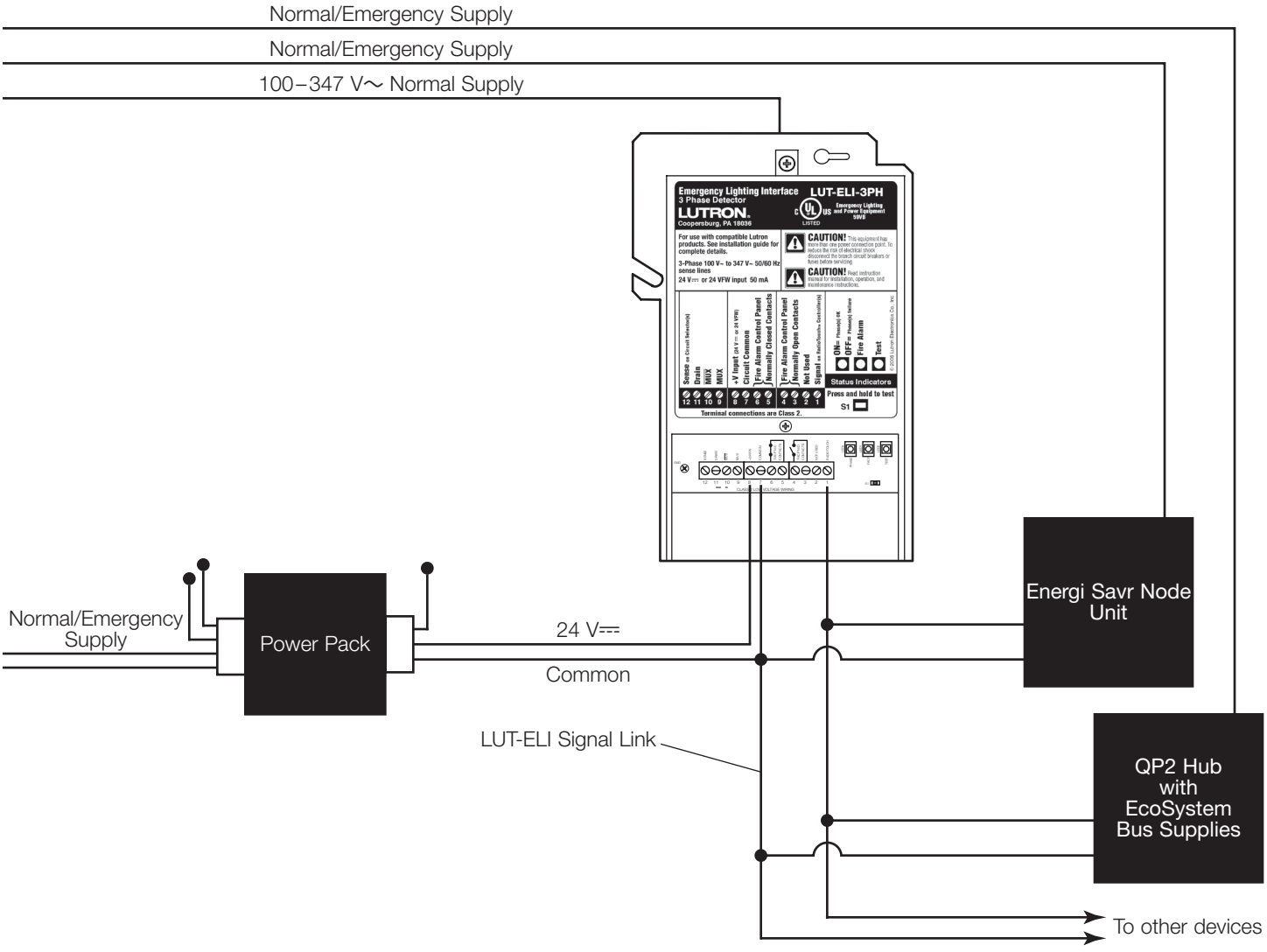
## Frequently Asked Questions (continued)

***FAQ 3:*** (continued)

***A:*** (continued)

**Sharing the LUT-ELI Among Multiple Devices** (continued)

***Sharing when only Quantum EcoSystem Bus Supplies or Energi Savr Node units are included***



## Frequently Asked Questions (continued)

***FAQ 4:*** *I want only certain outputs on a Lutron device to go into emergency mode and still be able to control the other outputs. How can I achieve this?*

***A:*** When a LUT-ELI signals a device that normal power has been lost, all of the outputs will go to their designated emergency level and cannot be controlled until normal power is restored. In order to retain control of those outputs, consider one of the following options:

- Use a separate control device that is not connected to the LUT-ELI. This device and any other applicable system device will need to be fed with normal/emergency power in order to retain control when normal power is lost. For example, you may want one EcoSystem loop to go into emergency mode while another remains controllable; in that instance, you could use two Energi Savr Node EcoSystem devices with one loop for each. The first would be wired to the LUT-ELI and the second would not, but both would be supplied with normal/emergency power. This application is common in facilities that have both Life Safety and Critical circuit branches. A LUT-ELI would be used with devices controlling Life Safety lighting to ensure egress illumination requirements are met. Critical branch lighting would be also fed with normal/emergency power but the lighting control system would retain control of the Critical branch lighting. For these Critical branch applications, it's important to note that other system controls that must remain operable (e.g., keypads, interfaces, Quantum or Athena processors) should also be powered by normal/emergency power. This includes line voltage products that may be supplying low-voltage power to other controls.
- In place of the LUT-ELI, use an ALCR for the outputs that must go to full on when normal power is lost. This will bypass emergency power around a specific output and still allow for control of the other outputs.

***FAQ 5:*** *Since power panels, T-Series loops, and EcoSystem loops automatically go to full on when normal power is lost without using a LUT-ELI, what is the benefit of using a LUT-ELI for these devices?*

***A:*** Even though power panels, T-Series loops, and EcoSystem loops do have this functionality, there are several benefits to using a LUT-ELI with those products:

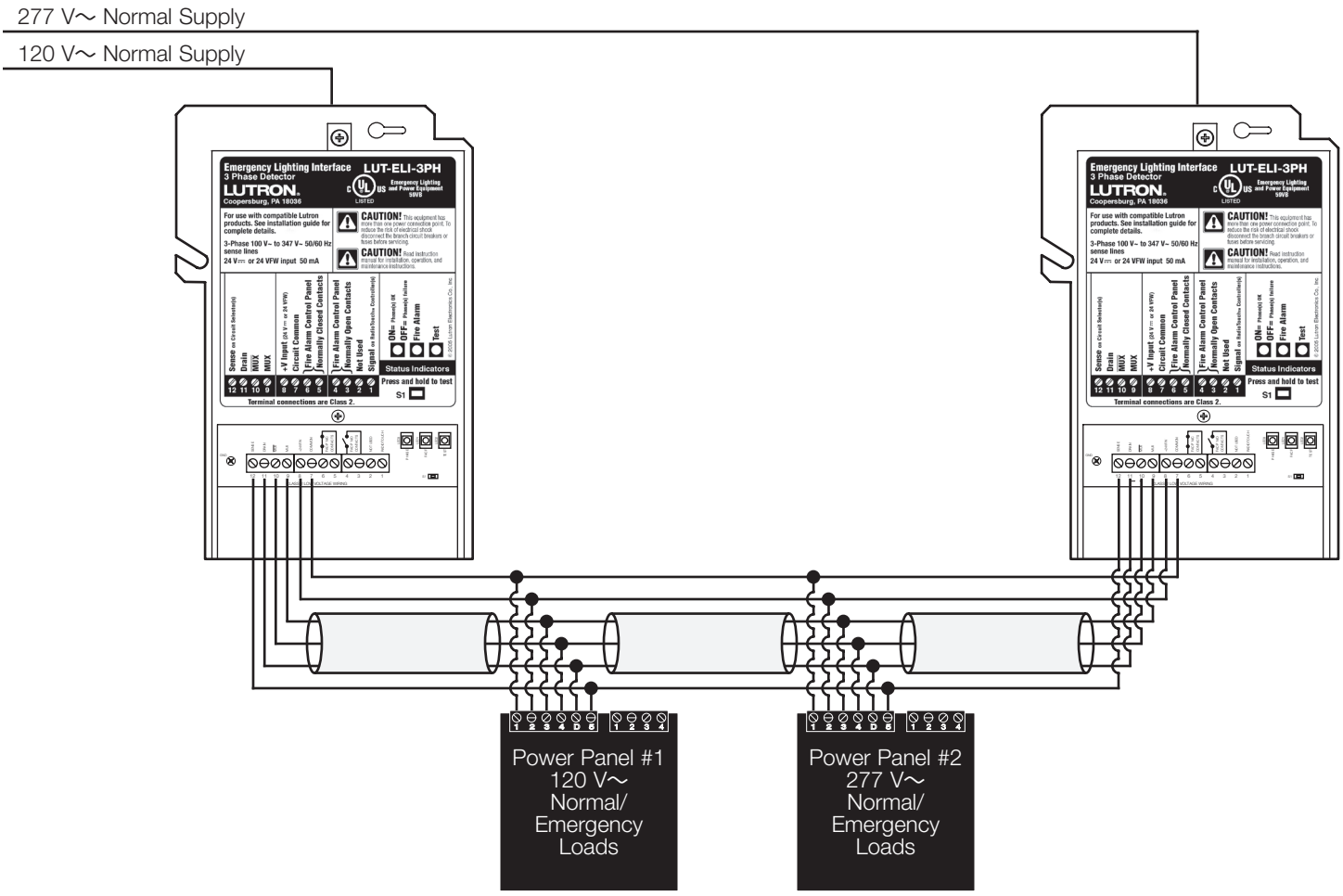
- When a LUT-ELI is used, the lighting control system becomes listed under UL® 924. This listing cannot be achieved without using the LUT-ELI.
- The LUT-ELI can sense all three phases of power and then signal a Lutron device when any phase has been lost. When a LUT-ELI is not used with power panels, T-Series loops, or EcoSystem loops, only one phase of power can be monitored; even in large power panels that have a 3-phase feed, only the phase powering the circuit selector or LCD controller is monitored.
- When a LUT-ELI is not used, a minimum of two power panels are required: one panel is connected to normal power and provides a sense signal to a second power panel that is connected to normal/emergency power. Without the normal panel, the normal/emergency panel has no sense signal to determine whether normal power is present.

## Frequently Asked Questions (continued)

***FAQ 6:*** *I have two power panels on the same link: one is powered by 120 V~ and the other by 277 V~; both are controlling normal/emergency circuits. How do I use the LUT-ELI in this situation?*

***A:*** The LUT-ELI can monitor only one voltage feed at a time, so this arrangement would require two LUT-ELI devices: one for monitoring the 120 V~ feed and one for monitoring the 277 V~ feed. Note that this can apply whenever power panels on the same communication link have two or more sources of power that need to be monitored. As described below, there are two ways that this installation can function:

1. If either the 120 V~ or 277 V~ power is lost, both power panels will go into emergency mode. To achieve this functionality, all five wires on the panel link should be connected between both panels and LUT-ELI devices.




**Note**

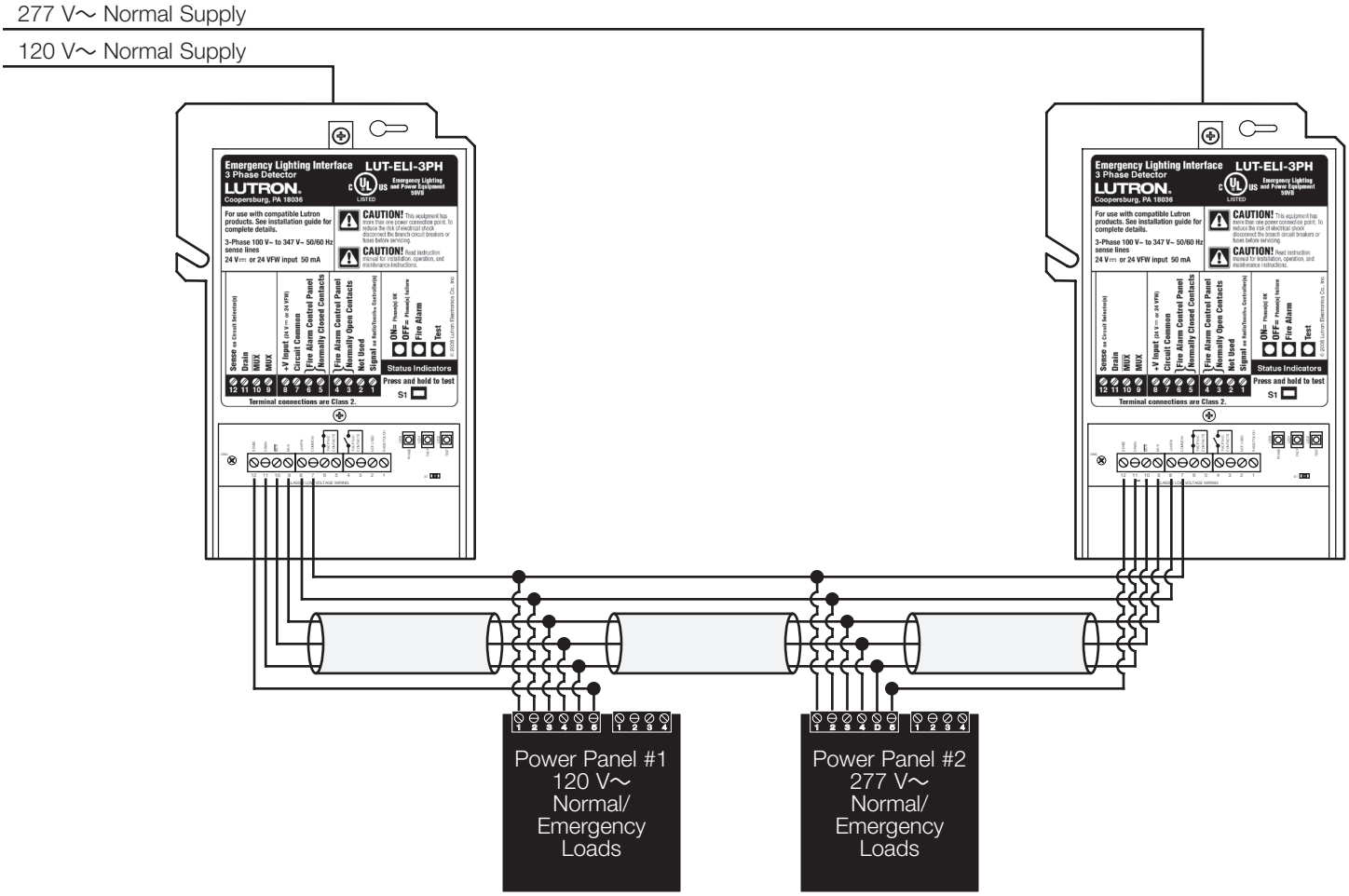
Panel link wiring must be daisy chained. Image above is for reference only.

## Frequently Asked Questions (continued)

***FAQ 6:*** (continued)

***A:*** (continued)

2. The 120 V~ power panel should go into emergency mode only when 120 V~ power is lost. Similarly, the 277 V~ power panel should go into emergency mode only when 277 V~ power is lost. In this case, the sense line (pin 5) on the panel link should not be connected between the two power panels. Refer to the wiring diagram below.




**Note**

Panel link wiring must be daisy chained. Image above is for reference only.

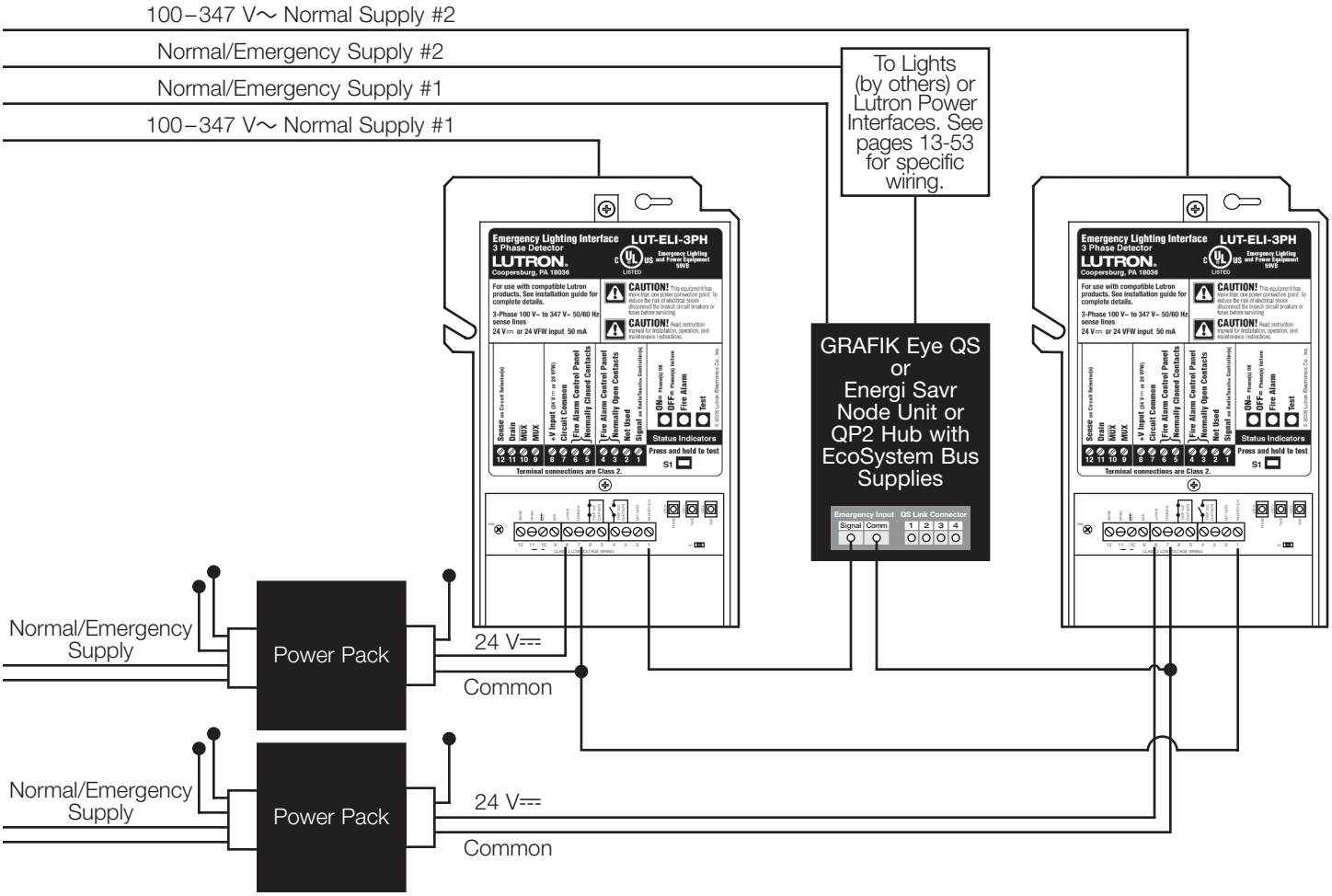
## Frequently Asked Questions (continued)

***FAQ 7:*** *I have a Lutron device that is powered by one voltage source but it needs to control emergency fixtures on a different source. How do I use the LUT-ELI in this situation?*

***A:*** Below are some common applications where this can occur:

- 120 V~ Power Panel controlling 277 V~ power interfaces
- 120 V~ GRAFIK Eye QS controlling 277 V~ power interfaces
- 120 V~ GRAFIK Eye QS EcoSystem controlling 277 V~ EcoSystem ballasts or drivers
- 120 V~ QP2 Quantum Hub with Bus Supplies controlling 277 V~ EcoSystem ballasts or drivers

In this situation, Lutron recommends using two LUT-ELI devices — one to monitor each source — to guarantee that if either source is lost, the system will go into emergency mode. Note that this setup requires that both the controller and the loads be supplied with normal/emergency power. When this is difficult to accommodate, an ALCR may be a more workable solution because it requires only one normal/emergency feed. Refer to *FAQ 6* regarding applications with power panels. For all other applications, refer to the wiring diagram below for series wiring of LUT-ELI devices.




**Notes**

1. As many as 16 LUT-ELI units may be wired in series; continue to wire the signal and common in one continuous loop if more LUT-ELI units are required. The LUT-ELI signal can then be shared with up to 32 devices as illustrated in FAQ 3.
2. The LUT-ELI cannot be shared with power panels in this application.
3. If a GRAFIK Eye QS is the load controlling devices, it cannot power any of the LUT-ELI units; a separate power pack must be used for each LUT-ELI in all series wiring applications.

## Frequently Asked Questions (continued)

***FAQ 8:*** *I have multiple areas which are fed from different sources of power. I have a separate LUT-ELI for each source, but I want all of my devices controlling emergency loads in each area to go into emergency mode when any source of power is lost. How do I use the LUT-ELI?*

***A:*** Refer to *FAQ 7* for series wiring with multiple LUT-ELIs.

***FAQ 9:*** *How far can I run the LUT-ELI signal or sense wire?*

***A:*** When the LUT-ELI is used on the power panel link, the sense line can be run as far as the panel link — 2000 ft (600 m). When the LUT-ELI is used with Quantum EcoSystem Bus Supplies, Energi Savr Node, or GRAFIK Eye QS products, the signal line can be run up to 2000 ft (600 m) with 18 AWG (1.0 $mm^2$) wire.

***FAQ 10:*** *Do I need to use the LUT-ELI if I want to interface with a fire alarm system? Can't I just use another input in the Lutron system to send the lights to full?*

***A:*** The loss of normal power is not the only emergency that can occur in a building; in the event of some other disaster, such as a fire, emergency lighting is expected to be operating. The LUT-ELI can interface with a fire alarm system through contact closures. Other Lutron devices can also accept contact closures and trigger the lights to go to full on as well, so it might seem as if a LUT-ELI is not necessary in these emergency situations. However, the LUT-ELI is the only device that can send lights to an emergency level and guarantee that all forms of control are locked out from changing the light levels; other input devices cannot guarantee that control is locked out.

***FAQ 11:*** *How many LUT-ELI can be wired in parallel on one fire alarm input and how far can I run the fire input wire?*

***A:*** When using either the normally open or normally closed contact closure input on the LUT-ELI with a fire alarm outpug, the number of LUT-ELI and distance may vary based on the installation. The contact closure capability of the fire alarm needs to be considered. The LUT-ELI provides a maximum current of 20 mA that needs to be carried by the contacts. Therefore, a contact rated for 100 mA can only be used with a maximum of 5 LUT-ELI. The following table gives the wiring limitations of multiple LUT-ELI connected to a single fire alarm input. If the application exceeds 10 devices, please contact Lutron for more information.

| | Number of LUT-ELI | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Wire Size Limitations** | | | | | | | | | | |
| **16 AWG (1.5 $mm^2$)** | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) |
| **18 AWG (1.0 $mm^2$)** | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 3800 ft (1158 m) |
| **20 AWG (0.75 $mm^2$)** | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 3400 ft (1036 m) | 3000 ft (915 m) | 2600 ft (793 m) | 2400 ft (732 m) |
| **22 AWG (0.50 $mm^2$)** | 4000 ft (1220 m) | 4000 ft (1220 m) | 4000 ft (1220 m) | 3700 ft (1128 m) | 3000 ft (915 m) | 2500 ft (762 m) | 2100 ft (640 m) | 1800 ft (549 m) | 1600 ft (488 m) | 1500 ft (457 m) |
| **24 AWG (0.25 $mm^2$)** | 4000 ft (1220 m) | 4000 ft (1220 m) | 3000 ft (915 m) | 2400 ft (732 m) | 1800 ft (549 m) | 1500 ft (457 m) | 1200 ft (366 m) | 1200 ft (366 m) | 1000 ft (305 m) | 900 ft (275 m) |
| **26 AWG (0.20 $mm^2$)** | 4000 ft (1220 m) | 3000 ft (915 m) | 2000 ft (610 m) | 1500 ft (457 m) | 1200 ft (366 m) | 1000 ft (305 m) | 800 ft (244 m) | 700 ft (214 m) | 650 ft (198 m) | 580 ft (177 m) |

## Frequently Asked Questions (continued)

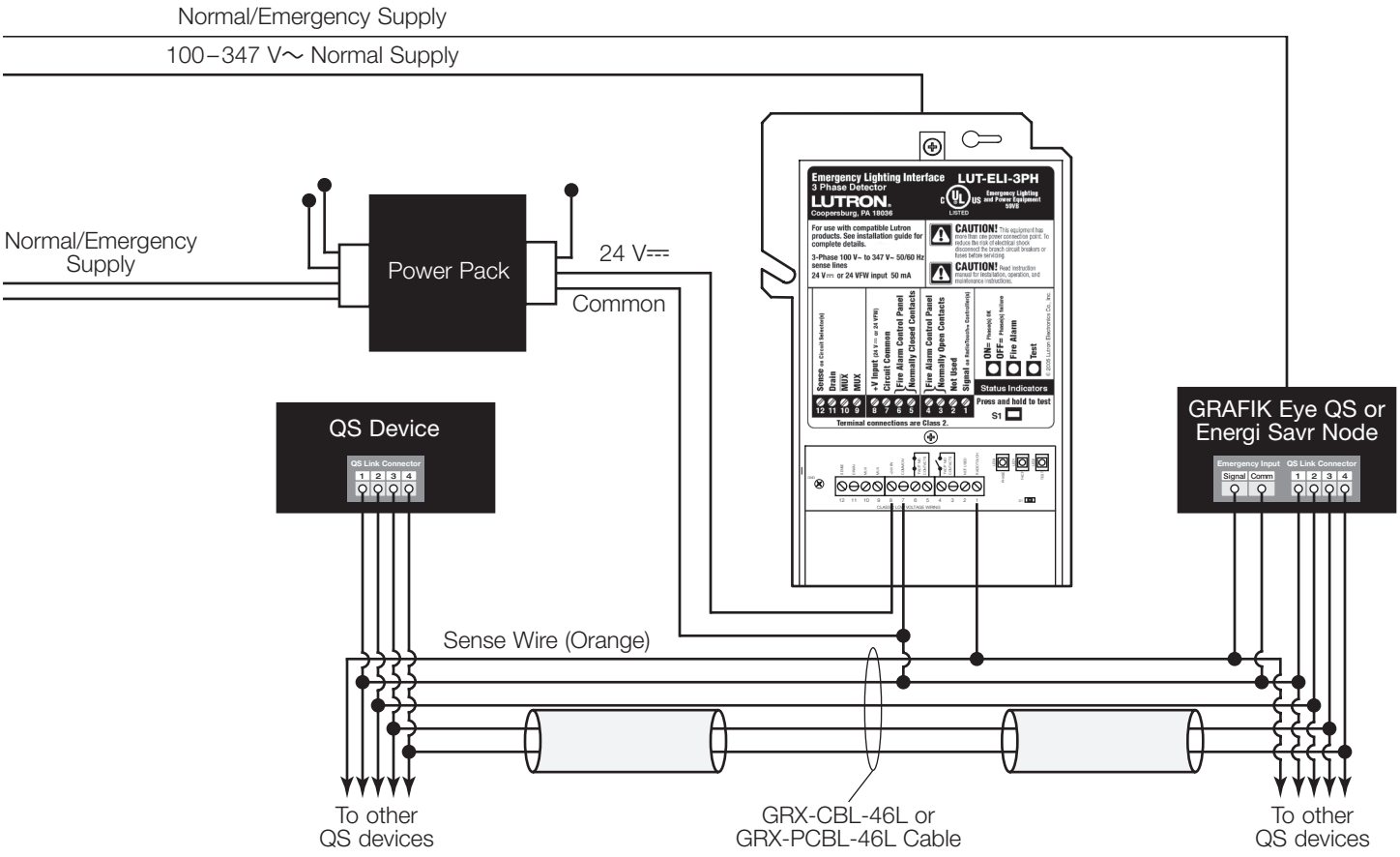
***FAQ 12:*** Can I use the LUT-ELI to trigger another event in my Lutron system (e.g., open shade when normal power is lost)?

***A:*** In order to trigger an event in the system using the LUT-ELI, the system must have a QSE-IO, GRX-IO, or OMX-IO. The signal output (terminal 1) or the LUT-ELI must be wired to the input of the IO device. The CCI inputs must be configured for a normally closed input. When doing this special considerations must be taken:

1. The LUT-ELI cannot be shared on the panel link with the IO device.
2. The IO can be the only device on the LUT-ELI. Do not wire in parallel with other devices.

***FAQ 13:*** *I am using Lutron cable GRX-CBL-46L or GRX-PCBL-46L to wire the QS link. I would like to save some wiring by using the sense wire and common wire in this cable for the LUT-ELI signal. Can I do this?*

***A:*** When using this cable for the QS link, the sense wire is typically not used because the QS link requires only 4 conductors. When the LUT-ELI is being used with devices on the QS link, the unused sense wire can be used to carry the LUT-ELI signal to the appropriate devices. Refer to the illustration below for wiring details.




**Note**

In this application, the LUT-ELI must be powered by a power pack, even if interfacing with a GRAFIK Eye QS

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