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EMERGENCY POWER SYSTEMS

WHITEPAPER

An Application Overview of UL924 ALCR's & UL1008 ATS's

Prepared by LVS, LLC a Subsidiary of Myers Emergency Power Systems

Background:

In accordance with NFPA101 and NEC Article 700, emergency lighting is required to illuminate automatically upon loss of normal lighting in a space. Recent code revisions have further clarified that, in installations where emergency lighting can be switched off or dimmed, a listed device must be provided to override such control to the ON position upon loss of normal lighting (NFPA101 7.8.1.2.2 (2)). NEC further defines two categories of acceptable control device:

- Automatic Load Control Relays (ALCR's) which are listed under UL924 and cannot be used as transfer equipment (NEC 700.26).
- Branch Circuit Emergency Lighting Transfer Switches (BCELTS's) which are listed under UL1008 and can be used as transfer equipment. It is important to note that BCELTS's are a recent addition to the code and are a subset of the broader UL1008 transfer switch category. Both BCELTS and non-BCELTS transfer switches, if listed to UL1008 and listed for emergency use, can be used to control emergency lighting. However, BCELTS devices carry an additional restriction of being limited to use on 20A branch circuits (NEC 700.25), whereas other UL1008 devices do not.

An important takeaway is that the bypassing/overriding of lighting control does not rely on a transfer of power taking place. There are numerous methods (shunts/bypasses) which can override lighting control, without transferring power, and are listed as Automatic Load Control Relays under UL924.

Applications:

In the electrical design process, a specifier must sometimes select between these two categories (ALCR & BCELTS) of device. What follow is a high-level overview of industry best practices and methodologies for making this selection. In many cases, more than one device category can be acceptable (from a code and function perspective) for the same application.

1. From a practical standpoint, the most important factor in selecting the proper emergency control category, is the type of normal lighting control being used (switched, 0-10V, DALI, line voltage/phase dimming). The table below illustrates the most efficient solution(s) for the respective control categories:

Normal Lighting Control Type	Emergency Lighting Control Type
Non-controlled (Nightlight)	NONE REQUIRED because emergency lighting is always on
Switched (On/Off)	ALCR (BCELTS also acceptable)
0-10V Dimmed	ALCR (BCELTS also acceptable)
Phase (line voltage) Dimming	BCELTS
DALI	ALCR (BCELTS also acceptable)

2. Another important factor is panel loading and power metering.

   When using UL924 ALCR's, the emergency lighting load is always fed by the emergency panel. Thus, load calculations for the normal panel can exclude the emergency lighting load. When using UL1008

BCELTS, the emergency lighting load is transferred between the normal and emergency panel. Therefore, both panels must be sized to accommodate the emergency lighting load. In installations where sub-metering of electric bills is desired, a BCELTS should be used to ensure that the normal panel (which is typically sub-metered) properly accounts for the emergency lighting power usage.

3. A final factor for consideration in certain jurisdictions is NEC 700.16

   Emergency lighting systems shall be designed and installed so that the failure of any individual lighting element, such as the burning out of a lamp, cannot leave in total darkness any space that requires emergency illumination.

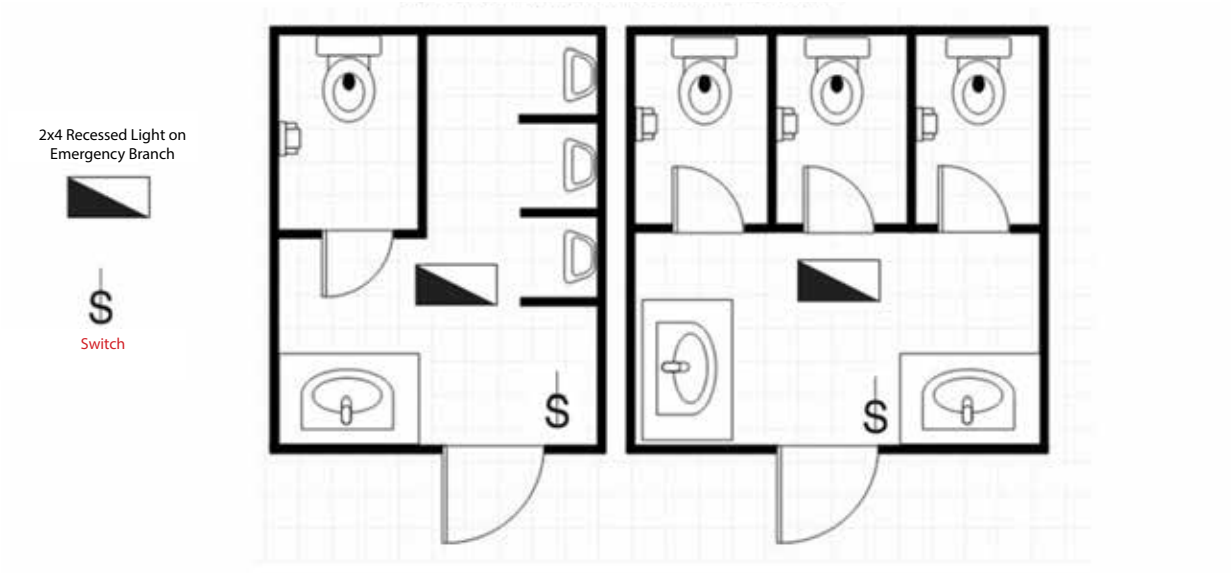
   In areas where all luminaires in the space are emergency luminaires (such as stairwells or small restrooms), some AHJ's require UL1008 BCELTS devices, as they will permit emergency illumination to continue so long as EITHER the normal or emergency panel are still energized. A UL924 ALCR will not allow emergency lighting to continue if the emergency panel is lost. This interpretation hinges on the inclusion of the emergency panel in "individual lighting element." Further code clarification on this topic is being considered by the NEC for the next code cycle. In areas with both normal and emergency illumination, the NEC 700.16 is not at issue, because the loss of emergency lighting will not leave a space in total darkness, because normal fixtures are still operating in the space.

COMMON APPLICATION EXAMPLE OF UL1008 TRANSFER DEVICE

Using a UL1008 device where there is only one fixture supplying light in an area with no windows or other light is an example of NEC 700.16 to make sure there is always light in an area.

Public Bathroom

Use UL1008 Transfer Device to Meet NEC 700.16



UL924 Bypass, UL924 Shunt and UL1008 ATS internal diagrams continue on the following pages.

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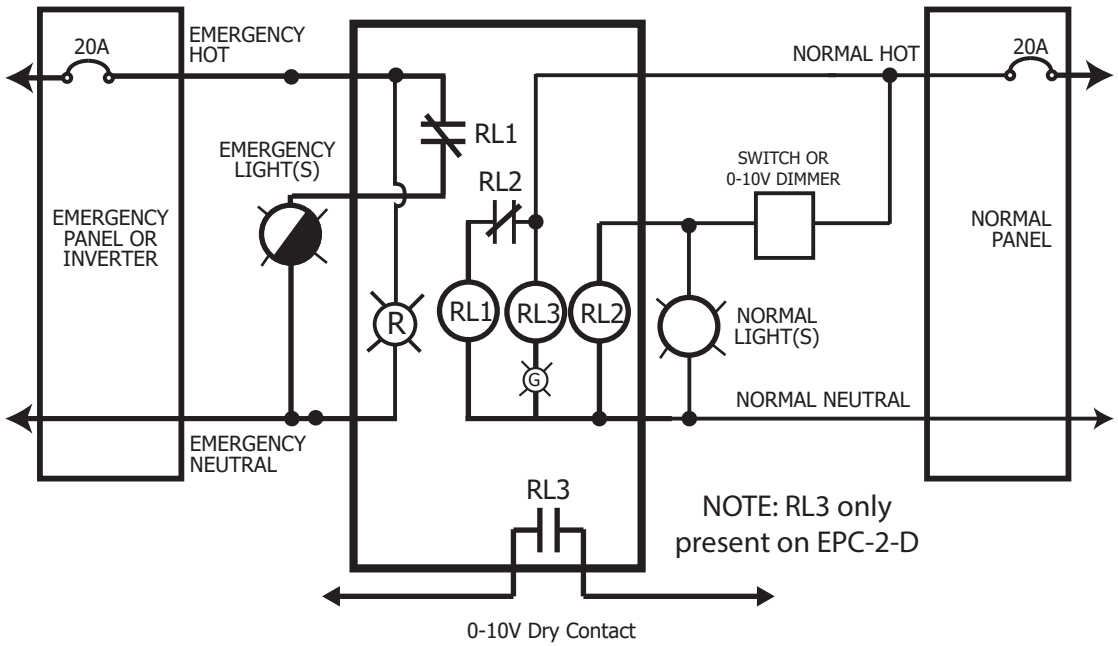
UL924 BYPASS (ALCR) TYPICAL WIRING



Theory of Operation:

When normal power is available, and switch is OFF, RL2 is de-energized and closed . RL1 is energized and open. Emergency and normal lights are both OFF.
When normal power is available, and switch is ON, RL2 is energized and open. RLY1 is de-energized and closed. The normal and emergency lights are both ON.
When normal power is lost, RL1 and RL2 are de-energized, and closed. The emergency light(s) will stay on regardless of switch position.

NOTE: RL3 (where applicable) is closed when normal power is available, and 0-10V dimming of both normal and emergency lights is possible. RL3 is open when normal power is lost, ensuring emergency lights come on at full brightness regardless of dimmer position.

LVS®

Basis of Design:
LVS EPC-2/EPC-2-D or
Myers Emergency Power Systems RLY-SW-2/RLY-DIM-2D
or equal

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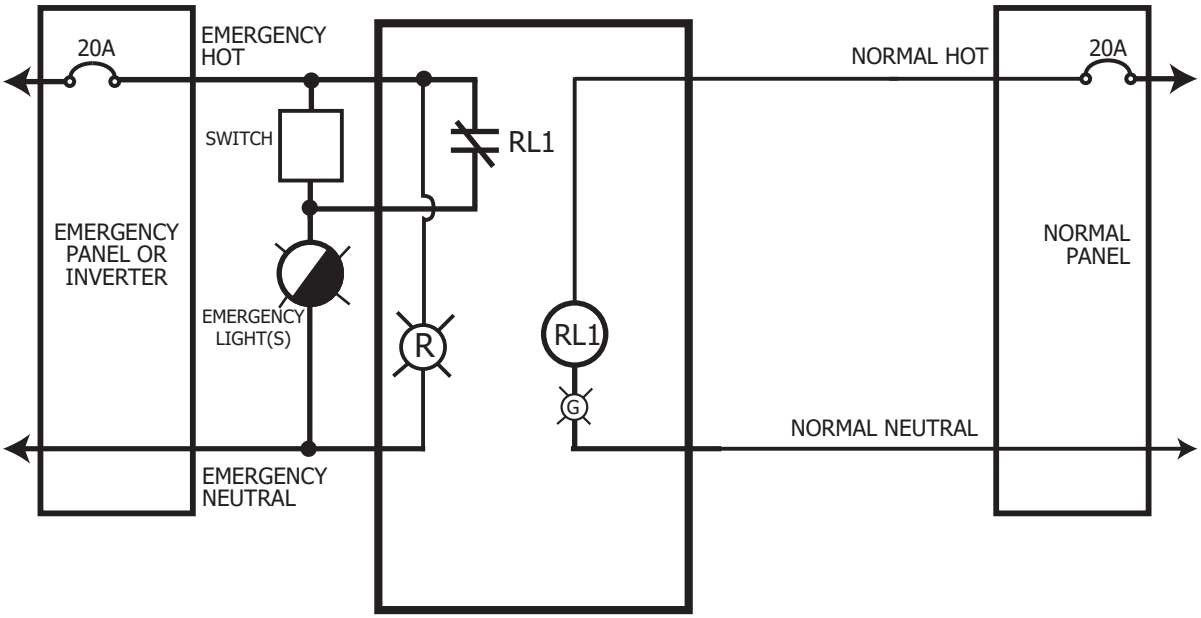
UL924 SHUNT (ALCR) TYPICAL WIRING



Theory of Operation:

When normal power is available, RL1 is energized, and open. The local switch can control the emergency light(s). When normal power is lost, RL1 is de-energized, and closed. The emergency light(s) will stay on regardless of switch position.

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Basis of Design:
LVS RRU-UNV or
Myers Emergency Power Systems RLY-SW-1
or equal

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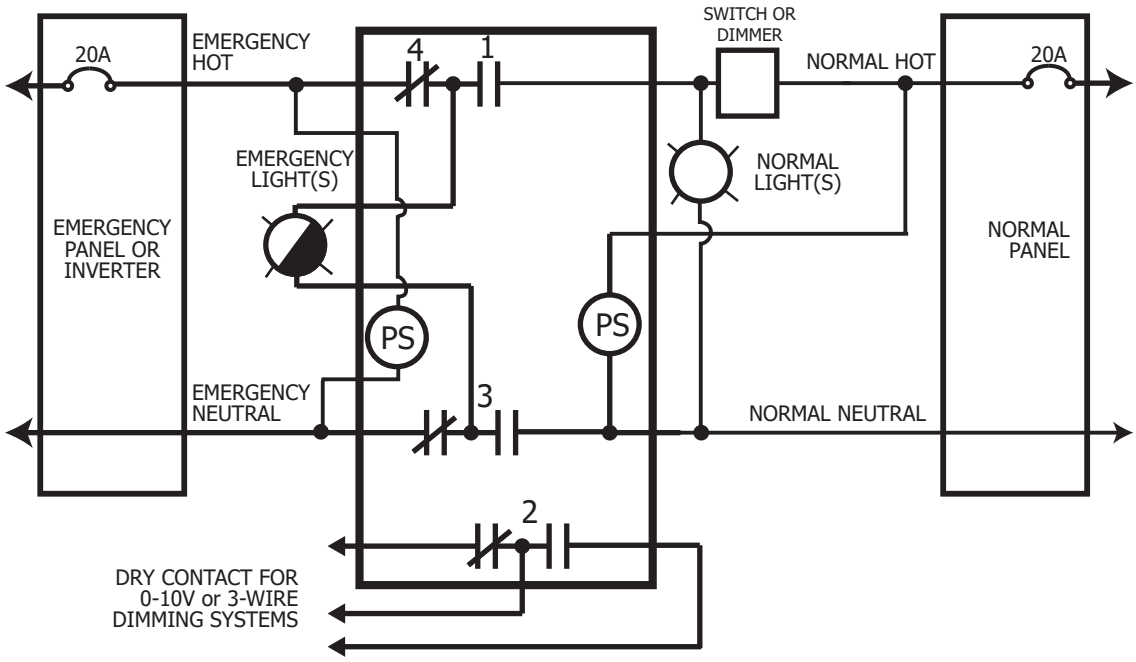
UL1008 BCELTS TYPICAL WIRING



Theory of Operation:

All relays are shown in emergency state (normal power lost).
When normal power is available, relays change position and switched/dimmed normal power can flow to both normal and emergency lighting.
When normal power is lost, relays move to N/C position (shown in drawing above) and constant emergency power can flow to emergency lighting, ensuring it comes ON at 100% brightness regardless of switch/dimmer position.

LVS®

Basis of Design:
LVS EPC-D-F-ATS or
Myers Emergency Power Systems RLY-DIM-D
or equal