

## Lighting Solutions for Marine Applications

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### Overview

Marine applications pose unique challenges for lighting control products and systems. Products installed on marine vessels typically require higher degrees of protection by their enclosure in order to protect against water damage. Power generation on marine vessels is often ungrounded which poses challenges for electronics and dimmers. Also, onboard power generators are more susceptible to anomalies in the AC waveform due to the connected load and can undesirably affect the lighting on board.

This document will highlight the primary design considerations for marine applications and will provide recommendations to ensure the best experience for guests on board. This document is a supplement to any applicable local or national code requirements.

### Keypads

Lutron offers a wide array of low-voltage QS keypads that are IP20\* rated for indoor applications only. If controls are needed in spaces that require weather resistance, Lutron offers several custom\*\* product options based on the requirements of the application:

#### Weatherproof† Thermoplastic Covers

- Protective cover for designer opening controls.
- Spring-loaded PVC cover with gasket.



#### Weatherproof† seeTouch Faceplate Kit and Membrane

- IP65 rated keypad designed for wet environments.
- Silicone membrane to protect Lutron controls outdoors.
- Provides water resistance for Lutron keypad.



#### Storm Keypad

- IP67 rated keypads for the ultimate protection in harsh environments.
- Available in 4-button configuration.



Additional keypads also available on projects using these Lutron Contact Closure Input (CCI) devices: QSE-CI-WCI and QSE-IO.

\* IP ratings, defined in IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code), is a measure of the degree of protection provided by an enclosure against the ingress of both solid objects and water.

\*\* For pricing and availability of custom products, contact your Lutron representative or call Customer Assistance at 1.844.LUTRON1 (588.7661).

† These devices are designed to protect against weather elements but they are not IP65 or IP67 rated. If this is required, please use other keypad offerings that are specifically designed and tested to these standards.

## Dimming Technology

To prevent issues with dimming performance due to power anomalies, Lutron recommends using Ecosystem controls and drivers in marine applications. EcoSystem drivers have high quality power supplies and digital dimming communication that is separate from line voltage. This ensures smooth dimming performance and immunity to basic line anomalies. EcoSystem digital communication allows the driver to be constantly powered in a low power draw state, which virtually eliminates inrush current and offers minimal effect on the power system THD levels. All Lutron ballasts and drivers are tested to comply with NEMA 410 standards for front-end input capacitance and inrush current. Lutron offers both a wide variety of fixture options (via partnerships) and ease of specification with the [High-Performance LED Fixture List](#) tool.

### Lutron Recommended Solutions

Equipment: LQSE-2ECO-D or QSNE-2ECO-D

Driver: EcoSystem LED Driver

If phase-control dimmers are being used, keep in mind that conventional dimmers synchronized to the power line are highly susceptible to power line anomalies. The Lutron Real-Time Illumination Stability Systems (RTISS and RTISS-TE) have been engineered to deliver high dimming performance in environments with poor quality power supplies.

### Lutron Recommended Solutions

Equipment: LQSE-4A-D or QSNE-4A-D; RPM-4A, RPM-4U, RPM-4E, or RPM-4J

For more information on dimming LED loads, see the [Controlling LEDs](#) white paper.

For more details, see the [RTISS Operation](#) and [RTISS-TE Operation](#) white papers.

## Power Generation

Marine vessel power generation systems are often ungrounded Delta-feed supplies. The earthing (grounding) for these systems presents a particular challenge for the surge suppression in electronic equipment. For these applications, Lutron offers custom\* versions of the products below to ensure proper operation on vessels with ungrounded power generation systems.

GRX-31xx,	LQSE-4S10,	LQSE-2DAL,	LQSE-4A,	QSN-4S16,
HWI-WPM,	QSNE-4S10,	QSNE-2DAL,	QSNE-4A,	QSN-4T16,
QSGRx-xx,	LQSE-2ECO,	LQSE-4T10,	LQSE-4M,	QSN-1ECO
	QSNE-2ECO,	QSNE-4T10,	QSNE-4M,	QSN-2ECO

The full array of Lutron low-voltage devices are not affected by the power generation system and can be used in these applications.

\* For pricing and availability of custom products, contact your Lutron representative or call Customer Assistance at 1.844.LUTRON1 (588.7661).

## Panels and Load Centers

Lutron dimming equipment is designed to be convection cooled and does not rely on fans or intercoolers to maintain the expected product lifetime. It is essential that the panel vents have the proper clearance necessary to allow for convection cooling and to ensure warranty coverage.

When placing Lutron DIN rail power modules in enclosures manufactured by other companies, the guidelines described in [Application Note #466](#) must be followed. Depending on the temperature conditions, derating of the modules may be required.

## Wiring

Confined spaces usually found in marine applications may require a Low Smoke Zero Halogen (LSZH) cable for control wires. Consult with the inspection authority for your country and/or the Classification Society (e.g., American Bureau of Shipping, Bureau Veritas, Det Norske Veritas, Germanischer Lloyd, Lloyds Register of Shipping) responsible for the classification and certification of a particular ship and its components. If a LSZH cable is required, [Belden 1502SB](#) is an acceptable cable for Lutron system communication. Please note that this cable uses 18 AWG (1.0 mm<sup>2</sup>) power wires and has length limitations when used in a Lutron system. Consult the [Power Draw Units \(PDUs\) on the QS Link](#) specification submittal for more information. If plenum-rated cable is acceptable, Lutron recommends using [GRX-PCBL-346S](#) cable.

## Maintenance

Lutron recommends that the vessel is staffed with a representative that is trained on the Lutron system and can perform basic maintenance and troubleshooting.\* Lutron also recommends maintaining a stock of spare parts in the event that a part must be replaced at sea. If remote access is possible, the Lutron system should be set up to be accessed remotely. This will allow remote support options to be available if needed.

\* Lutron provides training as an included service with the startup and programming of most systems. Contact your local Lutron representative for more information.

## **Quality and Reliability**

For over 50 years, the core competency of Lutron has been in the innovation of lighting controls and control integration. Choosing Lutron controls is choosing a company that is committed to meeting evolving market needs and producing high performance products for end users.

### **High Performance Product and System Design**

- Electronic components operate cooler than their rated temperature at full load, which significantly improves product lifetime.
- Superior dimming performance. RTISS line noise filtering technology ensures performance even in variable power conditions.
- Clear Connect technology ensures reliable wireless communication.

### **Rigorous Testing and Control**

- 100% of products are end-of-line tested.
- Quality audits of packaged products prior to shipment.
- Products are cycle-tested to simulate a minimum of 10 years constant use.

### **Continuous Evaluation and Improvement**

- Field analysis and post-occupancy evaluations help ensure customer satisfaction.
- Rigorous supplier quality audits to maintain Lutron quality standards.
- Field returns are analyzed and recycled.
- Continuous testing and evaluation of new technologies.

### **Global Service and Customer Assistance – Wherever and Whenever You Need Us**

24/7 live customer assistance by trained, Lutron-employed technical professionals and engineers. U.S.A.-based assistance for the Americas. Regionally-based assistance for Europe, Asia, Africa, and Australia.

### **End-user Support**

Warranty, non-warranty, and support services are available for the life of the Lutron system.

### **Knowledge and Training**

Product and system training is available online at [www.lutron.com/lcionline](http://www.lutron.com/lcionline), at a Lutron site, at the customer site, or at an interactive Lutron Experience Center.

## Additional Considerations

- Temperature, humidity, and clearance requirements for devices must be taken into consideration at the time of system design. Most Lutron devices are rated for indoor applications only. If outdoor rated equipment is required, contact your local Lutron representative for more information.
- Mounting any RF device on or near a metal surface will drastically reduce the effective range of RF transmission or reception. All RF devices must be mounted on non-conductive materials to ensure proper performance. Please consult the specific Lutron product specification submittal or installation guide for more information.
- Due to changing time zones, Lutron recommends using occupancy sensors to achieve automatic shutoff instead of time-based events. If scheduled timeclock events are required, the Lutron system time (with respect to the time zone of the port of call) can be updated via the Lutron Designer programming software or through Lutron integration protocol ([www.lutron.com/TechnicalDocumentLibrary/040249.pdf](http://www.lutron.com/TechnicalDocumentLibrary/040249.pdf)).
- RTISS-TE is not enabled by default on LQSE-4A and QSNE-4A modules but can be enabled via software or button programming. Please contact Lutron Customer Assistance for more information.

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