Cloudy Day Sensor Package

The CES cloudy day sensor package allows the QS shading system to respond to changes in cloud cover based on the settings of the controller. The package includes a QSPS, (1) QSPS-P1-1-50, (4) CES cloudy day sensors, (4) LC8 controllers and (1) PC-SIM calibration unit. Additionally (1) QSE-I/O is required to accept the CCI signal from the LC8 controller. This is not provided in the package.

Features
- Allows management of Lutron QS shading systems through dry contact closure outputs from the LC8 controller.
- The controller features adjustable On and Off setpoints.
- The package may be integrated into any Lutron system that has Quantum® with Hyperion™ Solar Adaptive Shading.

Model Number:
QS-CES-R-PKG
Specifications

LC8 Controller
Each Controller shall be powered by 24 V, and have separate high and low fully adjustable setpoints. Signal/setpoint and relay status indication shall be provided along with calibration input for adjustment. The controller shall be enclosed in a plastic enclosure for surface mounting installation. The controller shall provide a 10 A low voltage Form C relay output.

- Dead Band: Adjustable - 5-95%
- Input Delay: Standard - 30 second Sensor (removable for adjustment)
- Output: Standard - Form C SPDT Relay 10 A resistive
- Circuit Board: 3.75" H x 2.25" W x 1” D
- Plastic Box Dim.: 4.75” H x 2.25” W x 1.5” D

Environment
- Operating temperature: 13 – 140 °F (-11 – 60 °C).
- All CES sensors are water-resistant and designed to withstand UV radiation.
- LC8 Controller and QSPS are for indoor use only.

CES Sensor
The photoelectric device shall be a Class 2, low-voltage, ambient light sensor designed to interface directly with the analog input of the Shading Control System. The sensor shall supply an analog signal to the EMS system proportional to the light measured. The sensor output shall provide for zero or offset based signal. The sensor shall be capable of a fully adjustable response in the range between 0 and 2,500 foot candles with minimum sensitivity of 0 +/- 25 ft candles and rated for continuous outdoor service.

The sensitivity adjustment shall be at the sensor body, and outside of the sensor’s viewing angle. The sensor housing shall be constructed from GE Cycolac (R) ABS, shall be flame retardant and meet UL 94 HB standards.

The sensor shall have a hood over the aperture to shield the sensor from direct sunlight. The sensor circuitry shall be completely encased in an optically clear epoxy resin. The sensors shall mount to a standard threaded ½ inch conduit or a fit ½ inch knockout. The sensor range shall be between 0 and 2500 FC.
Wiring Diagram
Installation

Mount the LC8 controllers and QSPS power supply in the same location as the QSE-IO unit using the adhesive strips provided. Choose a location where the QSPS series power supply can be provided with power. Up to four controllers can be powered by one QSPS plug in power supply.

Install the QS-CES-R sensors on the roof of the building pointing in the direction of each façade. The sensors are designed to be screwed into ½” conduit facing the horizon with the hood protecting the sensor element from precipitation and dust.

Use 18 gauge wire minimum for connecting the sensors on the roof. Maximum wire run from LC8 to CES sensor of 4000 feet.
### Power

#### CES Sensors
- Operating Voltage: 24 V\(\text{\textless}\) PELV (Class 2: USA).
- Operating Current: 40 mA nominal from 24 V\(\text{\textless}\) supply.
- Control Output: 0 – 10 V\(\text{\textless}\) signal representative of ambient light present (input to LC8 controller).

#### QSPS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage</td>
<td>100-240 V~</td>
</tr>
<tr>
<td>Input current (MAX)</td>
<td>1 A</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>24 V(\text{\textless})</td>
</tr>
<tr>
<td>Operating Frequency</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>ESD Protection</td>
<td>(+/-) 16 kV</td>
</tr>
<tr>
<td>Miswire Protection</td>
<td>Electronic Automatic Reset</td>
</tr>
<tr>
<td>Input Wiring</td>
<td>Available with 3 types of line cords. All 6 ft (1.8 m) Plugs into standard receptacle</td>
</tr>
<tr>
<td>QSPS-P1-1-50</td>
<td>NEMA 5-15 Plug</td>
</tr>
<tr>
<td>Weight</td>
<td>0.3 lb (0.14 kg)</td>
</tr>
</tbody>
</table>
| Regulatory | UL (1310 CLASS2)  
CE (IEC 61558)  
CUL (CSA C22.2 #223) |
Calibration

The goal of sensor calibration is to pick a set point level that corresponds to the threshold of comfort for natural light inside the building. Each installation will have a different threshold value depending on its mounting location relative to the building and the occupants. Since the optimum set points will vary from job to job, the starting point is only used as a guideline. The sensors should be calibrated to meet the preference of the customer during the initial occupancy. The controller(s) should be mounted where they will be easily accessible to the building administrators and maintenance personnel for adjustment.

The QS-CES-R sensor is pre-calibrated to the light levels required for rooftop operation. No adjustments can be made on the QS-CES-R.

Calibration can be made with either an iterative process or during a predictable transition in sunlight, like sunrise or sunset.
Iterative Calibration

Calibration in the field is performed by adjusting the knobs labeled “On” and “Off” inside the QS-LC8. Below is a legend showing the foot-candle values, which correspond to the positions on the adjustment knobs inside the GRX-LC8. Each GRX-LC8 will have to be calibrated to the conditions of the location.

<table>
<thead>
<tr>
<th>Adjustment Knob Setting (volts)</th>
<th>Corresponding Foot-Candle Set point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>250</td>
</tr>
<tr>
<td>2</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>750</td>
</tr>
<tr>
<td>4</td>
<td>1000</td>
</tr>
<tr>
<td>5</td>
<td>1250</td>
</tr>
<tr>
<td>6</td>
<td>1500</td>
</tr>
<tr>
<td>7</td>
<td>1750</td>
</tr>
<tr>
<td>8</td>
<td>2000</td>
</tr>
<tr>
<td>9</td>
<td>2250</td>
</tr>
<tr>
<td>10</td>
<td>2500</td>
</tr>
</tbody>
</table>

In order to accurately adjust the GRX-LC8 for use with the Cloudy Day sensor, it is recommended to use a PC Simulator. The PC Simulator plugs into the port labeled “SIMULATOR JACK.” A digital voltmeter plugged into the PC Simulator will show the accurate calibration voltage, which corresponds to the knob setting and a foot-candle value. Use the following steps to adjust the On and Off threshold to the starting values given below.

During initial occupancy, adjust all 8 set points up or down by 0.25 volts at a time depending on comfort. If the shades are closed too often on cloudy days, adjust the levels up. If the shades are open too often on cloudy days, adjust the levels down.

Recommended Defaults:
On set point: 2.25 V (565 ft-candles)
Off set point: 2.50 V (625 ft-candles)
Iterative Calibration (continued)

1. Connect the power to the GRX-LC8 Controller as shown in the wiring diagram.
2. Remove the cover of the GRX-LC8 and connect the PC Simulator and digital voltmeter as shown in the diagram below.
3. Set the voltmeter to a range that will show 0-10 VDC with resolution to at least 1/10th of a volt (0.0v) or better.
4. Adjust the knob on the PC-simulator until the voltmeter shows the On setting desired.
5. Using a small flat head screwdriver, adjust the knob labeled “On” to zero.
6. Turn the knob slowly clockwise until the light adjacent to the knob turns on. Adjust the screw to as close to the position where the light goes from off to on as possible.
7. Repeat steps 4-6 using the Off set point and the knob labeled “Off.”
8. Remove the PC-Simulator and replace the cover of the GRX-LC8.
9. Repeat for remaining LC8 controllers.

Sunrise or Sunset Calibration (Optional):

The sensors may be calibrated during sunrise or sunset on a sunny day to quickly and accurately determine the optimum threshold values for each job.

**Sunrise:**
- Have an observer sit at a workstation near an eastern facing window that will have direct sunlight exposure during sunrise.
- Connect a digital voltmeter directly to the sensor output between terminal 1 and 4 on the LC8 controller for the east facing sensor.
- When the sunlight exposure begins to become uncomfortable to the observer, record the reading from the sensor that is shown on the voltmeter.
- Use the calibration procedure above to reset the On and Off set points. Use the observed reading as the Off set point. Subtract 0.25 volts for the On set point.
Sunrise or Sunset Calibration (continued)(optional)

Sunset:

- Have an observer sit at a workstation near a western facing window that will have direct sunlight exposure during sunset.
- Connect a digital voltmeter directly to the sensor output between terminal 1 and 4 on the LC8 controller for the west facing sensor.
- When the sunlight exposure is no longer uncomfortable to the observer, record the reading from the sensor that is shown on the voltmeter.
- Use the calibration procedure above to reset the On and Off set points. Use the observed reading as the On set point. Add 0.25 volts for the Off set point.
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Specification Submittal Sheet
for Cloudy Day Sensor

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Job Name: ____________________  Model Numbers: ____________________

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