Short Form Specifications & Benefits

Lutron HomeWorks®
Interactive Lighting
Controls Specification

GENERAL

1. Manufacturer shall have a minimum of 10 years continuous experience in the manufacturing of lighting controls.
2. Lighting controls shall be UL listed, or meet CSA, NOM, CE, and C-TICK standards (where appropriate) specifically for the required loads (i.e. incandescent, or magnetic and electronic low-voltage, fluorescent, etc.). Manufacturer shall provide evidence of compliance on request.
3. Manufacturer shall have quality systems registered to ISO 9001 Quality Standard, comprised of in-house engineering for all product design and field support.
4. Manufacturer shall have a component quality program in place to reduce defective levels to less than 100ppm and provide documentation on request.
5. Lighting controls shall be tested per IEC801-2 to withstand a 15kV electrostatic discharge without damage or loss of memory.
6. Manufacturer shall provide software to simplify the design and installation of all lighting controls.
7. Lighting controls shall operate in an ambient temperature range of 0°C (32°F) to 40°C (104°F)
8. Manufacturer shall provide a minimum of a one-year warranty.

PRODUCT

1. Manufacturer shall be Lutron Electronics Co., Inc.
2. Lighting controls shall meet applicable requirements of UL 20 and UL 1472 regarding the inclusion of a visible, accessible air gap off switch and the limited short circuit test.
3. Controls for magnetic low-voltage fixtures shall be end-of-line tested to ensure that any operating condition (including an unloaded transformer) does not overheat the transformer.
4. Controls and electronic dimming ballasts for fluorescent fixtures shall be manufactured and supplied by the same manufacturer or as an approved system by both ballast and control manufacturer.
5. Lighting controls shall provide power failure memory. Should power be interrupted, and subsequently returned, the lights will come back on to the level set before the power interruption. Restoration to a default level shall not be acceptable. Additionally, lighting controls storing presets will retain the preset levels in memory.
6. Manufacturer shall ensure the following items regarding product color:
   - Product color matches NEMA standard WD1, Section 2 and the maximum color deviation from this standard shall not exceed $\Delta E=1$, CIE L*a*b color space units. For non-NEMA colors, color match coordinated shall be provided on request.
   - Color variation of any control in the same product family shall not exceed $\Delta E=1$, CIE L*a*b color units.
   - Visible parts shall exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674-89 Manufacturer to submit proof of testing on request.
7. Lighting controls shall be 100% end-of-line tested for proper electrical, functional and tactile operation before shipment from factory. Manufacturers who end-of-line test by sampling shall not be acceptable.
8. Lighting Control System (LCS) shall be Lutron HomeWorks Interactive.

9. LCS shall consist of:

   a. A *seamless network* of up to 16 Processors for communication and data storage, each capable of up to 256 zones, for a total system capacity of up to 4096 zones.

   b. Up to 96 wall-mounted Keypads or system interfaces per Processor for a total of up to 1536 keypads per system.

   c. Remote Power Modules (RPM) (including dimming, switching, and motor control modules) located in lighting control panels in order to *reduce wall clutter.*

   d. Local wall-mounted, *multi-zone, preset scene Dimming Modules* with user interface to allow simple programming changes without the need for a personal computer.

10. LCS shall provide control of up to 4096 zones, 30,000 scenes, and up to 1,536 keypads/interfaces. System shall be programmable with a Windows®-based PC. Light levels shall fade smoothly between scenes at time intervals of 0 seconds to 99 minutes and 99 seconds including individual fade and delay per zone. System shall provide the following capabilities: astronomic time clock, vacation mode programming, security mode programming, bi-directional RS-232, conditional logic, keypad/interface enable and disable, manual sequencing, automatic sequencing, and central monitoring. System shall be capable of remote programming and diagnostics via a modem connection.

11. Keypads/interfaces shall provide the following capabilities: button-by-button programming, conditional logic programming, timeclock enable/disable, single action, toggle, advanced toggle, manual sequencing, automatic sequencing, raise/lower, bi-directional RS-232, infrared inputs, contact closure inputs and outputs. Keypads with LEDs shall include confirmed status feedback, with room, scene, or pathway logic, ensuring that LEDs represent actual confirmation of events. LED status that mimics button presses shall not be acceptable.

12. LCS shall provide *fail-safe operation*. In the event that one or more of the lighting control Processors is not present or is disabled, the following shall be possible:

    a. All circuits controlled by the LCS that were on prior to the power disruption shall remain on at the same intensity, and all circuits controlled by the LCS that were off prior to the power disruption shall remain off.

    b. Where remote Dimming Modules are used, it shall be possible to turn on to any preset level, including off, any lights controlled by these modules by installing and using a low-voltage dry-contact override switch, or by cycling the breaker feeding the module.

    c. During the power disruption, it shall be possible to turn on, off, or dim to any level, any local dimming or switching control directly from the face of the control.

    d. During the power disruption, it shall be possible to select a preset lighting scene, turn on, off, or dim each circuit to any level on any local wall-mounted, multi-zone, preset scene dimming module, directly from the face of the module.

13. All local wall-mounted, multi-zone, preset scene Dimming Modules, Remote Power Modules (RPMs), and Processors shall have independent power supplies so that failure of an individual part or subassembly shall not result in loss of control of all loads controlled by the LCS.

14. All line-voltage connections to RPMs and processors must be made with a *visible positive mechanical connection*. No pin and socket or stab-in connectors shall be accepted.

15. All components of the LCS, including the Processors and Keypads, shall not be damaged in the event of any *miswires* or shorts between any two low-voltage wires.

Lutron HomeWorks® Interactive Lighting Controls Specification continued

16. Remote power motor control modules shall be capable of controlling up to 4 independent 3-wire motors. Each Motor Module relay output shall be *electronically-interlocked* to ensure positive protection, so that both "direction 1" and "direction 2" motor windings can not be energized at the same time. Module shall have a programmable maximum time that either "direction 1" or "direction 2" motor windings can be left in the energized state.
17. LCS shall be capable of *real time control* of light levels. LCS shall be capable of sending zones to specific light levels, flashing zones, enacting scenes, and capturing light levels, from a Windows®-based software utility.
18. LCS shall be capable of providing diagnostics via LEDs on the system's processor, keypads, and power modules, as well as device verification tests in the Windows-based software utility. LCS provides diagnostics indicating: positive communications between components and existence of properly addressed components.

EXECUTION

1. Equipment shall be installed utilizing manufacturer's cut sheets and installation instructions and in accordance with these specifications.
2. Lighting controls shall be distributed by an ISO 9001.
3. Manufacturer shall provide a toll-free technical support hotline 24-hours per day, 365 days per year.
4. Manufacturer shall be capable of providing *Factory Commissioning* for LCS. Factory Commissioning shall consist of three job-site visits by a Factory Field Service Technician in order to check wiring and connections, program the LCS, and train end-users on the operation of the system.

SPECIFICATION BENEFITS (GENERAL SECTION)

Experience	Manufacturers with at least ten years of continuous experience in lighting control have seen virtually every issue that may arise in the manufacturing and application of these controls. They have also responded with time-tested solutions to these issues. Lutron Electronics not only has ten years, but 38 years of experience dedicated solely to the field of lighting controls. You can be assured that for the life of your dimming system, you will reap the benefits of 38 years of staying power, 38 years of innovations and solutions, and 38 years of superior customer service.
Standards	Underwriters Laboratories, Inc. is the leading U.S. independent product safety testing and certification organization. A UL trademark means UL found that samples of this product met UL's safety requirements and are periodically checked by UL at the manufacturing facility. In 2001, a new UL safety standard will become effective for dimmers. This standard introduces new test loads to address the proliferation of transformer and electronic ballast based low-voltage, incandescent, and fluorescent light sources. Unlike some manufacturers, Lutron dimmers have always been designed to control these types of loads. In fact, Lutron actually started UL listing dimmers to these new safety standards in 1996, five years prior to UL's requirement. In addition to meeting UL safety standards, Lutron dimmers meet the most demanding international standards including CSA, NOM, MITI, VDE, and IEC, including the latest IEC Electromagnetic Compatibility standards.
ISO 9001	Lutron's ISO9001 certification ensures that our quality is consistent throughout all aspects of the company and across all product families. ISO 9001 certification transcends the individual or the department by ensuring that the engineering, design, manufacturing and servicing of the company's products is consistent regardless of personnel changes within the organization.
Quality Programs	Lutron's extensive component quality programs result in a more reliable product. When you turn on your dimmer or power up your Lutron system, it's going to work, and it will keep working for years of maintenance-free operation.
Static Protection	The most common occurrence of electrostatic discharge occurs when you walk across a carpet and shock the lighting control. Products that are not designed to withstand this shock may reset or short out completely. Lutron products are designed to withstand a 15kV electrostatic discharge, a jolt similar to that of a person in slippers shuffling across a plush carpet in a dry house on a cold winter day.
Design Software	Lutron's automated design software eliminates errors during the project design process, and improves the quality of the corresponding project documentation. Well-specified, well-documented projects are easier to install, easier to service, and result in more satisfied customers with fewer callbacks.
Ambient Temperature	Lighting controls must be capable of working within the typical temperature range of a home or office, with allowances for reasonable temperature variations. This ensures reliable operation under any normal circumstance.

PRODUCT SECTION

Lutron	The benefit of specifying and/or installing a Lutron product is that you have chosen a product that is supported by 38 years of dedicated, proven experience in the manufacturing, sales, and service of lighting controls. Lutron is the number one choice of contractors around the world, and the recognized leader in the field of lighting control.

Air-Gap Switch

Ideally, when you change a burned out light bulb or lamp, there should be no electrical current running to the fixture. The best way to ensure this is to have a physical disconnection from the power source. Lutron lighting controls provide this feature by means of an air-gap off switch that is either:

- Integral to the product or
- Visible and easily accessible from the front of the product.

To change a light bulb, simply turn the product off if the switch is integral; otherwise move the air-gap off switch to the "off" position from the front of the unit. If a product does not incorporate an air-gap off, the only way to achieve a physical disconnect from the power source is to turn off the power at the breaker, something which almost no one will do.

Transformer Life

If a light bulb fails or is removed from the low-voltage transformer, Lutron lighting controls will not overheat your transformer. This is critical because an overheated transformer may not fail immediately, but its life span will be severely compromised.

One Manufacturer for the Entire System

Lutron manufactures both the ballasts and lighting controls that comprise our fluorescent systems. In the unlikely event that there is a problem on a job, Lutron will also solve the problem without question. In situations where the controls and ballasts are manufactured by different companies, customers may experience a great deal of frustration when they try to establish which product is at fault; and therefore which company needs to help them solve the problem.

Power Failure Memory

Most lighting controls can store information about preset lighting levels for up to ten years. Power failure memory is about more than storing preset information, it's about remembering the state of the lighting before the power failed, and duplicating it when the power is restored. If your power fails in the middle of the night when the lights are off, and is then restored, the lights will not jump to full on. Conversely, if you are working in a brightly lighted building and you experience momentary power failure, the lights will not stay off when power is restored. Lutron won't leave you in the dark. Consumers purchase battery backed-up alarm clocks to avoid just this type of problem...your lighting should give you the same peace of mind.

Color Matching

Lutron products of the same product family and color designation will match when you buy them today, and will still match when you add to the job several months or years down the road.

End of Line Testing

100% End-of-line testing ensures that when your Lutron product left the factory it was 100% operational, and will work when properly installed.

Seamless Network

The HomeWorks® Interactive Processor can control up to 256 zones of light and work in conjunction with up to 15 additional Processors to provide seamless control of up of 4096 zones of light.

Reduce Wall Clutter

HomeWorks® Interactive Remote Power Modules provide the ability to clean up walls in rooms such as dining rooms, great rooms, family rooms, and other prominent areas. Lights in the space can be wired to a Remote Power Panel, allowing elegant, wall-mounted Keypads to replace several dimmers or switches on the wall. Keypads include custom engraving to clearly identify each button's function.

Multi-Zone Preset

Multi-Zone Preset Local Lighting Controls, called GRAFIK Eye Controls, give homeowners the ability to quickly and easily adjust light levels and fade rates from the face of the GRAFIK Eye Control Unit that will be retained by the system. Additionally, GRAFIK Eye Preset Local Lighting Controls have the unique ability to continue to operate as local scene controls if the HomeWorks Interactive Processor is disabled.

Fail-Safe Operation

HomeWorks Interactive is the only lighting control system that combines the benefits of centralized dimming systems (using remotely-mounted power modules with wall-mounted Keypads in the space in order to reduce wall clutter) with the benefits of localized dimming systems (fail-safe operation).

In the unlikely event that the Processor(s) are disabled, the Keypads will no longer be able to communicate with the system. However, the homeowner will still have control over the lights in the home. GRAFIK Eye Preset Local Lighting Controls will continue to operate locally, exactly as they did when the Processor was on-line. Additionally, by installing and using a manual override switch, the homeowner can turn all the lights in remotely-mounted power panels on to a preset override scene. Unlike many other systems, this manual override can activate a preset level other than all lights on to full intensity.

Independent Power Supplies

Independent internal power supplies permit GRAFIK Eye Preset Local Lighting Controls to continue to operate locally in the unlikely event that the main Processor is disabled.

Visible Positive Mechanical Connections

Since lighting loads wired to remote power modules and Processors can turn off if a positive connection to these devices is not maintained, HomeWorks Interactive systems employ mechanical connections that are visible to the installer, ensuring a positive connection. Pin and socket connections that are made behind the devices and not visible to the installer cannot ensure a positive connection.

Miswire Protection

Accidental shorting of the low-voltage communication wires during installation of the system is quite common. Whether or not the main Processors in a HomeWorks Interactive system are powered at the time of the short, no damage to the Processors or any of the other components will occur.

Interlocked Motor Module

The HomeWorks Interactive motor control module supplies four bi-directional outputs for the control of drapes, window treatments, hurricane shutters, projection screens, and other motor loads. Since energizing both the “raise” and the “lower” contacts simultaneously can cause a motor to fail after a short period of time, protection against this occurrence is provided. The HomeWorks Interactive motor module uses two electrically-interlocked relays per output, rather than relying on software to ensure that the raise and lower contacts will not be simultaneously energized (even if either relay contact fails or welds together).

Real-Time Control

The HomeWorks Interactive system is capable of real-time control from Windows®-based software. The real-time control options include the ability to set light levels for any presets in the system from a personal computer. Additionally, the system has the ability to flash any zones individually, to assist in locating which fixtures are included in the zone. The system can also send any given zone to any level instantly. Once a Keypad button has been programmed, the button can be activated from the software for testing purposes.

Diagnostics

The HomeWorks Interactive system provides diagnostic features to assist in commissioning a system, programming light levels, and troubleshooting any installation problems. A device verification test can be run to verify the operation of all system components, and list for the installer any devices that are misadressed, and any devices not responding to the central processor. This test greatly assists in pinpointing any installation problems to

specific components so that a technician can troubleshoot problems efficiently.

EXECUTION SECTION

Instruction Sheets	Thorough information on how to install each product is included with your Lutron lighting control or system.
Personal Technical Support	The benefit of toll-free help, 24 hours a day, 7 days a week, 365 days a year is that we are always available to support you, and to support our products.
Factory Commissioning	Lutron has the capability to provide factory commissioning for HomeWorks Interactive systems. This will consist of a direct Lutron factory technician conducting three job site visits, as well as installing a modem on the job site so that additional programming changes and troubleshooting can be conducted by Lutron at a later date.