



GE Total Lighting Control



Commercial And Industrial Lighting Automation

*Featuring New
ProSys™ Lighting
Control Systems*



Why Lighting Automation?

LIGHTING IS THE SINGLE LARGEST USE OF ELECTRICITY in commercial and institutional buildings. Automated controls can save up to 50% of this power by providing the *right amount of light, where and when it is needed*. These same controls can also help provide a safer, more productive work environment while reducing building operation labor.

How Does It Save \$?

Energy = Watts x Time

Saving lighting energy requires that you either reduce the lighting wattage or reduce the run-time. High efficiency electronic ballasts, compact fluorescent lamps and reflectors all focus on reducing the connected lighting wattage.

Controls focus primarily on reducing the run-time

This is especially true of relay-based automatic switching systems such as Total Lighting Control. GE's product line has been fine-tuned over our more than 20 years in lighting automation to eliminate waste while maintaining occupant satisfaction and productivity.

Three Control Strategies

The GE TLC systems rely on three strategies to reduce run time:

- **Scheduling is by far the most common.** Effective systems allow lighting to be scheduled by area or function to automate common sense... when lighting isn't needed, turn it OFF.
- **Occupancy sensors are used** in those areas where occupancy is much less predictable, such as conference rooms and rest rooms. Ultrasonic sensors detect small human movements to turn lighting ON in these areas.
- **Daylighting takes advantage of natural light** by using sensors to reduce the run-time in daylight spaces.

For a successful application, all of these strategies must take into account how occupants use the space. In some areas, such as offices and classrooms, this means allowing for **Manual Overrides**.

When Should I Consider Lighting Automation?

Lighting control is always a good idea. The only question is whether the lighting should be controlled automatically, manually or both. Some practical indications that lighting automation makes sense:

- ✓ **Building codes may require it.**
- ✓ **A building automation system exists or is planned.**
- ✓ **You can identify more than 2 hours a day of wasted lighting operation.**
- ✓ **Lighting control strategies fit.** The most sophisticated lighting control system will not be effective for a 24-hour-a-day operation with no daylighting.
- ✓ **Room for improved building management.** Enhanced central control can reduce labor cost and improve building maintenance.
- ✓ **Lighting can be used to enhance the security system.**

Selecting The Right Lighting Control System

Selection of the right lighting control system depends largely on your individual application. Key factors that generally influence lighting control strategies and the level of automation required are:

- Building size, operating schedules and floor plans
- Building code requirements for lighting automation
- Degree of occupant interaction with lighting
- BAS and other building systems

GE Total Lighting Control offers a wide range of best-in-class solutions to suit virtually any lighting control requirement. From basic stand-alone systems to state-of-the-art LonWorks® enabled open systems, GE TLC can help you increase occupant productivity and satisfaction and reduce building operating costs. The table below shows some common applications along with the corresponding GE TLC solution, and is a useful starting point for identifying the appropriate system for your needs.

Application	TLC Automation Level	TLC Product Family	Features
Retail, Small Industrial	Level I – stand-alone systems	LV remote control	Basic stand-alone panel
		Softwired™ contactor	Softwired stand-alone panel
Office, School	Level II – intelligence, connectivity and interoperability	ProSys Level II	Networkable Softwired panels, clock functions, Softwired switches, enhanced programmability
		ProSys LM	ProSys II features <i>plus</i> LonMark® open system protocol
Large Office, Convention Center, Arena, Correctional Facility	Level III – programmable network systems	TLC Level III	Front-end monitoring and programming (PC required) of networked panels, expanded functionality including alarms, events, trending, tenant billing, phone override, color graphics

Remember that choosing a lighting control system goes beyond selecting specific hardware features; you are choosing a long-term partner for your building. GE is committed to providing the hardware, software and support services necessary to ensure minimal design time, trouble-free installation and continued reliable operation. And when you want to upgrade or expand your system, be confident that GE will provide a cost-effective upward migration path.

automation

Relays... The Heart Of Each GE System

THE STANDARD RR SERIES RELAYS have been in use for over 40 years. They are known to practically every electrical contractor and available at electrical distributors across the country. Each of the GE automation options uses the RR7P or RR9P as the basic power switching device. Relay-based lighting control solutions offer the ability to break individual circuits into multiple zones, and can be maintained without shutting down the lighting panelboard.

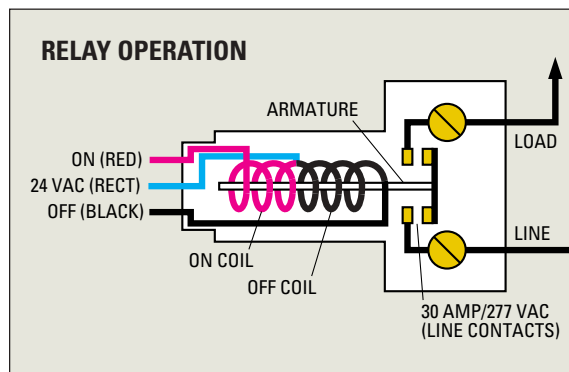


Relay Operation

The relay employs a split low-voltage (24 V) coil to move the line-voltage contact armature to the ON (OFF) latched position. As illustrated below, the ON coil moves the armature to the left when a 24 V control signal is impressed across its leads. The armature latches in the ON position and will remain there until the OFF coil is energized.

This operation provides several key control features:

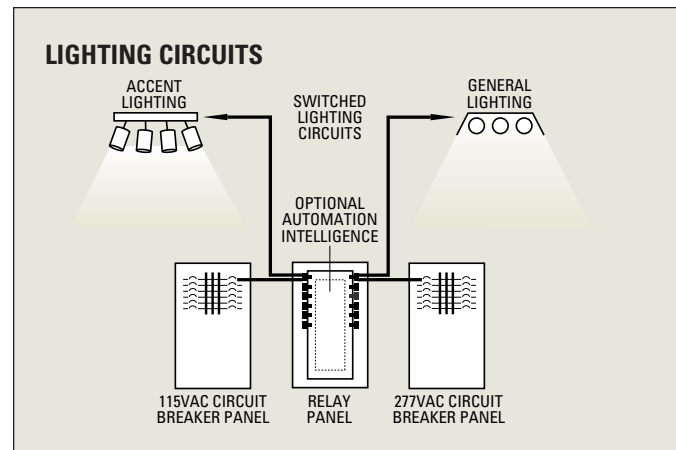
- **Stable operation.** Since the relay latches in the ON or OFF position, power outages do not result in a change of state. (Lights stay where they were after a power outage).
- **Minimal power consumption.** Control power is only required when the relay changes state.
- **Ability to support multiple input devices.** After the relay responds to a momentary pulse, it is then “free” to accept another pulse from any other control devices wired to it. The relay position is always controlled by the last signal.
- **NEC compliant.** Both RR7 and RR9 relays have been recently enhanced to meet NEC-110 10kA SCCR requirements (277V max.).



Relay Installation

The relays are typically mounted in an enclosure next to the circuit breaker panels in the electrical closet. Power is then routed from the breaker panel to the relays. A single circuit may feed several relays, and multiple panels may feed a single relay enclosure.

All GE TLC panels use a tub/interior configuration. This allows the tub to be shipped to the job site early for rough-in wiring. The interior with relays and cover can be mounted later. The interior also provides isolation between the Class II low-voltage wiring and line-voltage wiring to conform to NEC and UL.



Design Assistance...

USA & Canada: **1-877-LTG-CNTL**
(584-2685)

Before beginning the layout of a project, you may wish to ask your TLC representative for help in defining appropriate strategies, typical wiring and documentation forms, and application examples. You also have access to the most experienced lighting control applications group in the industry.

relays

Low-Voltage Remote Control Components

Product Overview

GE Remote Control system consists of modular components which the user configures to his application's needs. The basic low-voltage wiring (see illustration) allows flexible switching of any lighting load, grouping of lighting circuits for common control, and pilot light status feedback, providing a strong foundation for automation. To add the automation, many users in the past have simply installed a Master Sequencer and timeclock. At the end of the day, the sequencer would individually turn each relay OFF. Individuals wishing to stay late would simply turn their individual areas back on. Multiple OFF actuations from the timeclock or building automation system would "sweep" the relays every couple of hours to "catch" the overrides.

The new Smart Sweeper takes this simple automation to a new level. The timeclock determines "normal occupancy". Five minutes before end of day, the Sweeper blinks the lights to warn occupants staying late. Any override can be timed out with another blink warning at the end of the time delay period.

Key Features/Benefits

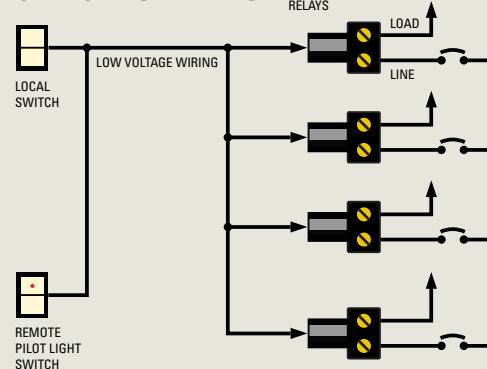
- **Multiple switch control** simplifies central and local control of lighting and makes it possible to control lighting easily from several locations.
- **Pilot light status feedback** provides visual indication of lighting status at remote switching location. (Applies to individual relay).
- **Relay grouping for common control.** Simple, low cost "multi-pole lighting contactor" function. Circuits can be grouped for common control and reconfigured as the building layout changes without affecting line-voltage wiring.
- **Low-voltage control wiring.** Small, low-voltage cables replace costly line-voltage wiring and conduit. Particularly important for long switchlegs.
- **Master ON/OFF with individual override** allows a group of relays to be turned ON/OFF as a group while retaining the ability to override an individual load. This is a basic requirement for successful automation: automate the OFF function for an entire floor or zone, but allow an individual occupant to turn his area back on.
- **Blink warn.** Critical function to protect occupants and reduce complaints when automatically turning off lighting. Not only provides warning, but "protects" the occupant's override from the next sweep.
- **Time delay overrides** provide a simple means of automatically timing out occupant overrides after hours without the need to program additional sweeps.
- **Occupancy sensor control.** Individual areas such as conference rooms and restrooms can be controlled based on occupancy. In conference rooms, local switches still allow lights to be switched off for presentations.

Target Applications

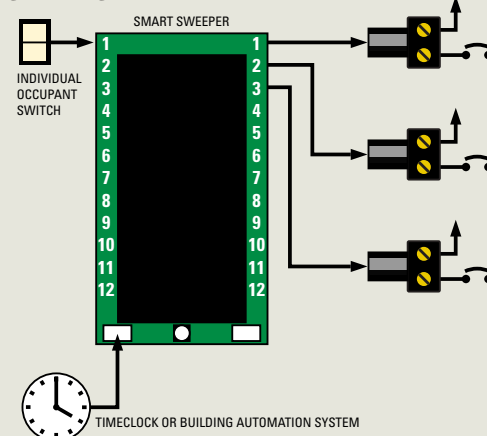
General Commercial, Industrial, Institutional



LOW-VOLTAGE WIRING



LIGHTING AUTOMATION WITH SMART SWEEPER



remote control

Softwired Contactor (SWC) System

SOFTWIRED LIGHTING CONTROL SYSTEMS replace the hardwiring of Remote Control Components with “Softwiring”™ to reduce design, installation and startup costs. Softwiring also allows intelligence to be added to a panel or small network of panels. The Softwired Contactor™ (SWC) system below is focused on grouping relays for control by a building automation system, such as in a store or factory. The ProSys Lighting Control System panels on the next page add the individual overrides and smart scenarios necessary for a stand-alone lighting automation system in a small office or school.

Product Overview

The Softwired Contactor (SWC) is a pre-assembled, factory-tested relay panel which can cut design, fabrication and installation time in half compared with do-it-yourself lighting contactor panels.

Each SWC panel includes “channels,” which may be softwired to any group of relays in the panel, allowing switches and/or inputs from automation systems to control the group. Isolated pilot contacts for each channel either provide feedback to the automation system or light a pilot light when all of the relays in the group are ON.

SWC is available in multiple sizes: 12-relay with 4 channels (softwired groups); 24-relay with 8 channels; and 36- or 48-relay with 16 channels.

Key Features/Benefits

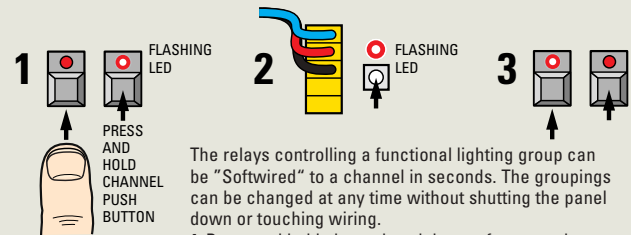
- **Softwiring** eliminates the need for separate Master Sequencers and hardwiring of relays to form relay groups. This cuts design and installation time, allowing relay groupings to be changed in seconds to accommodate changes in building lighting layout.
- **Overlapping groups increase design flexibility.** Allows master control of several relay groups and provides a means of separately controlling individual zones (poles). These functions are impossible with standard mechanically-held lighting contactors.
- **Universal inputs.** Each channel accepts either maintained or momentary, 2- or 3-wire inputs to simplify integration of both manual and automation system inputs.
- **Isolated group pilot.** Isolated pilot contacts for each channel provide status feedback to the automation system, confirming that an automation command has been properly executed or that there has been a manual override. These contacts may also be used to drive a pilot light to provide status indication for remote loads. Provides *status of a group* rather than an individual relay.
- **Simple group control.** The pre-assembled panel takes much of the time and effort out of design, installation, and maintenance. Because SWC is designed to control groups, *overrides direct to the relay are not supported.*

Target Applications

Retail, Manufacturing, Warehouses



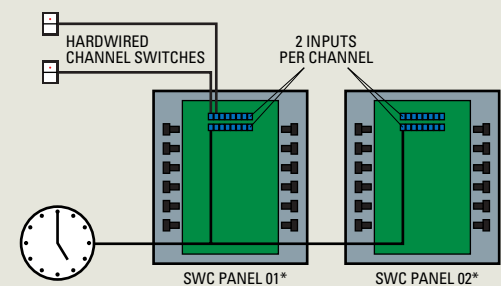
AT THE TOUCH OF A BUTTON



The relays controlling a functional lighting group can be “Softwired” to a channel in seconds. The groupings can be changed at any time without shutting the panel down or touching wiring.

- 1 Press and hold channel push button for several seconds. The channel LED and the LEDs for relays currently controlled by that input will begin to flash.
- 2 Select relays to be controlled by pressing the associated relay control button to add/delete that relay to/from the group.
- 3 Press channel push button again. The LEDs will stop flashing. The input now controls the selected relays.

ON/OFF CONTROL OF MULTIPLE CHANNELS



*BOTH PANELS MUST BE ON SAME PHASE

softwiring

ProSys™ Lighting Control System

Best-in-class Lighting Control For Stand-alone or LonWorks® Network Applications

GE Total Lighting Control's newest line offers powerful, best-in-class functionality for stand-alone applications, and adds LonWorks® LNS open system architecture for seamless integration with your BAS or other facility systems. Their flexibility and upgradeability allows them to grow with a building, making them ideal for a wide range of applications, from office buildings and schools to convention centers, arenas and correctional facilities.

ProSys Level II

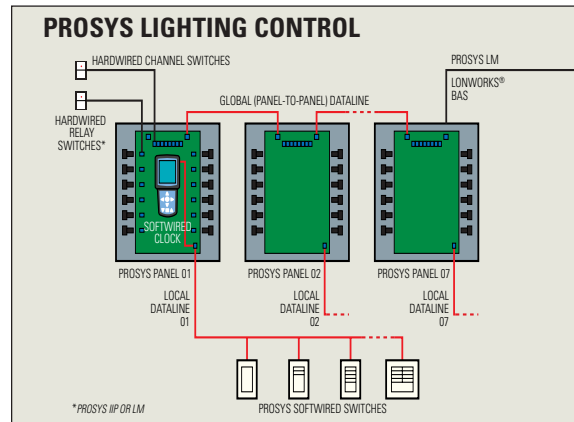
Made for either stand-alone or network use, the feature-rich ProSys Level II is easy to apply, install and use in 12-, 24- and 48-relay panels, and is easily upgraded to ProSys LM at any time.

- **Simple, flexible creation of functional lighting groups** – You can group any combination of relays within a single ProSys panel or up to 30 networked ProSys panels.
- **"Intelligent" Softwired switches** – You can easily program Softwired switches to control any relay or group of relays in single or multiple ProSys panels. A common low voltage wiring run eliminates expensive multiple "home runs." (Some limitations apply to the cable lengths. Please consult the GE Tech Center for further information.)
- **Powerful scheduling capabilities and "smart scenarios"** – Simply plug the optional ProSys Softwired clock into any panel in the network to assign relay groups, create scenes ("patterns"), program switches and create schedules that maximize savings and occupant productivity.
- **Distributed panel intelligence** – Each ProSys panel operates independently to ensure system integrity, even in the event of isolated failures.
- **Enhanced Softwired clock** – Plug the ProSys Softwired clock in at any point on the LonWorks control network to assign relay groups in any panel on the network. There is no need to visit every panel to create functional lighting groups.
- **Network expandability** – A network of ProSys II panels can accept up to 81 intelligent devices, including panels (30), ProSys Softwired switches (50) and a single ProSys Softwired clock.
- **Easily upgradeable** – If and as your needs change, you can upgrade ProSys Level II to ProSys LM system without changing out the panel.
- **Improved serviceability** – Panels can be removed for service *without* removing the relays.

ProSys LM True LonWorks Open Architecture For Seamless BAS Integration

A "total systems approach" to building automation requires the coordination of several different systems (lighting, HVAC, security, etc.) in an efficient, cost-effective manner. LonWorks-enabled products like ProSys LM reduce the installation, operation and expansion costs of the building automation system, and they free the specifier to choose the "best-of-breed" vendor for each subsystem.

- In addition to all the 'best-of-breed' functionality of ProSys Level II, ProSys LM delivers **true LonWorks LNS open system architecture capabilities** for seamless BAS integration.
- ProSys LM follows **complete LonMark® guidelines** and can interface easily with other LonWorks lighting systems, such as dimmable ballasts, motion sensors and wall switches.



- A network of ProSys LM panels can accept a *virtually unlimited* number of intelligent devices, including panels, Softwired switches or any number of LonWorks-enabled devices.
- Configuration plug-ins allow you to **integrate easily with other LonWorks-enabled building automation products.**
- **The ProSys LM features LonMark Technology, making future system changes simple and cost-efficient.** ProSys LM Systems work with any GE or third-party LonMark devices. Once the devices have been factory or field configured, the system reverts to "user programming mode." This allows any user-definable feature of the ProSys LM (schedules, switch assignments, etc.) to be modified without the need for plug-ins or special expertise. Simply make any desired changes using ProSys' programming functions.

Target Applications

Office Buildings, Schools, Convention Centers, Arenas and Correctional Facilities

Softwiring

Level III Programmable Networked System

Product Overview

Level III Programmable Networked Systems combine the power of the PC with distributed intelligence in each panel to provide maximum energy savings and occupant satisfaction.

When there are more than 4 or 5 lighting panels in the building, this system becomes the easiest system to document, program and operate, even for an operator with minimal PC skills.

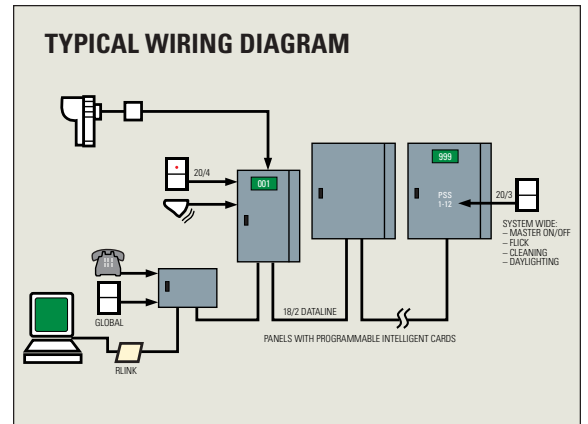
Powerful, flexible control software incorporates the latest features in software development for maximum flexibility and integration with other building automation systems. It builds on years of experience fine tuning the lighting automation features our customers need in the most easy-to-use system available. Optional software modules include energy usage analysis and graphics, giving the operator powerful tools for managing the facility.

Key Features/Benefits

- **Distributed panel intelligence.** Each panel operates independently, so the system continues to operate even in the event of isolated failures. Central stations are useful for monitoring and maintenance.
- **Remote/local PC programming.** Programming may be done at a central PC, a portable PC connected to a local panel or remotely via modem for maximum flexibility.
- **Expert lighting control scenarios.** Complete suite of occupant-sensitive, energy-saving scenarios, including smart time delay overrides via phone or switch, blink warning, cleaning/janitor function, daylight shed and common area control.
- **Multiple options for integration.** Options range from simple dry contact closure, to plug-in cards from selected BAS vendors, to complete front-end integration. Allow the owner or system integrator to choose the best interface to meet the overall needs of the building, without sacrificing the lighting automation scenarios that best meet the needs of its occupants.
- **Management reports.** Trend software provides a powerful tool for facility management, with exception reporting, activity logging and power consumption estimates.
- **Real time graphics.** Color graphics and optional animation allow operators or guards to monitor and control lighting easily with actual floorplan layouts.

Target Applications

Large Offices, Retail Chains, Manufacturing Complexes, Airports, Civic Centers, Stadiums





LONMARK®
PARTNER



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