



*GE Total Lighting Control*



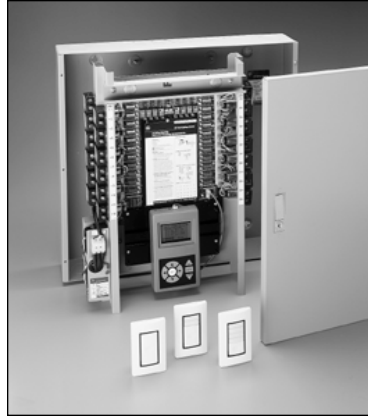
# Remote Control Low Voltage Switching

Components and Applications

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## Why Lighting Automation?



**L**IGHTING IS THE SINGLE LARGEST USER 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 needed, when needed*. These same controls can also help provide a safer, more productive work environment while reducing building operation labor.

### Energy Codes — Setting The Baseline

Many lighting control best practices have also become mandatory in many state energy codes. The new ASHRAE 90.1 Energy Standard\*, the basis for many state codes, includes mandatory lighting controls similar to those specified in California's Title 24, including:

- Automatic Shutoff Controls for Each Floor  
These may be either occupancy sensing or time based. If time based, the control device must also incorporate an override switch which controls a maximum of 5000 square feet and has an automatic time delay of not more than 2 hours.
- Manual Control of 50% of Lighting in Daylit Zones
- Photocell or Astronomical Time Switch Control of Exterior Lighting

### GE Total Lighting Control Solutions

GE offers a range of options to reflect the different control and operating requirements of different types of buildings (refer to publication GEA-TLCOVR8PG, "Commercial and Industrial Lighting Automation Options", for a comparison).

The three basic system types include:

- Remote Control Components (left above)  
The Remote Control solution provides a low-cost, modular component approach to lighting automation. The system begins with a flexible, low-voltage relay switching system. Automation devices are then layered on top of this switching platform. The basic relay switching platform and automation options are summarized on the next two pages.
- Softwired Switching System (center above)  
Softwired Switching adds microprocessor intelligence and dataline communications to simplify the design, wiring and operation of the lighting automation system, from standalone panels to small networks. (Refer to GEA-TLCSWS for details.)
- Programmable Networked System (right above)  
Programmable Networked Systems combine the power of the Personal Computer with distributed intelligence in each relay panel to provide maximum energy savings and occupant satisfaction. (Refer to GEA-TLCGOLD).

### Integration With Other Building Automation Systems

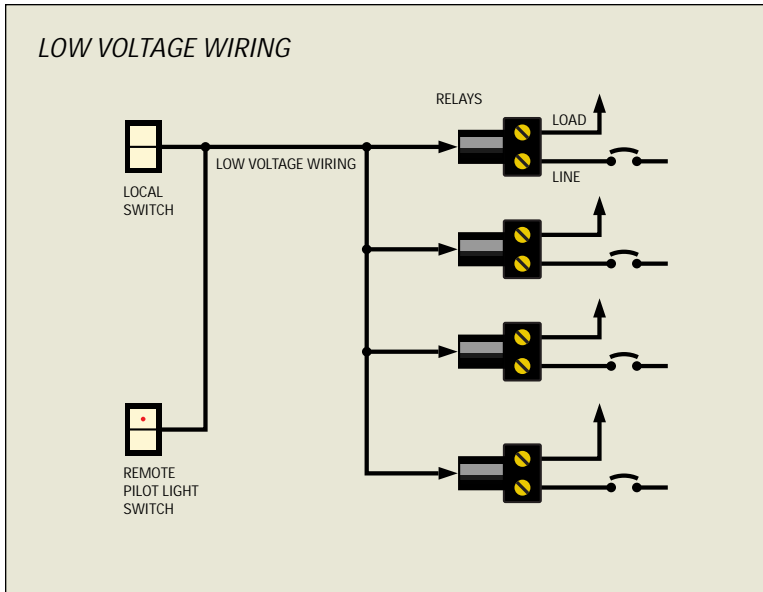
GE is committed to developing and adapting controls to the specific needs of each building. Lighting controls must:

- Respond to the needs of the occupants
- Provide value to the owner
- Install readily
- Operate flawlessly

Our systems are designed to integrate seamlessly with other building automation systems. For design assistance call 1-877-584-2685 in the United States, or 1-877-584-2685 in Canada.

\*The revised version of ASHRAE 90.1 is now in the public review process. Adoption is expected in the 1999-2000 timeframe.

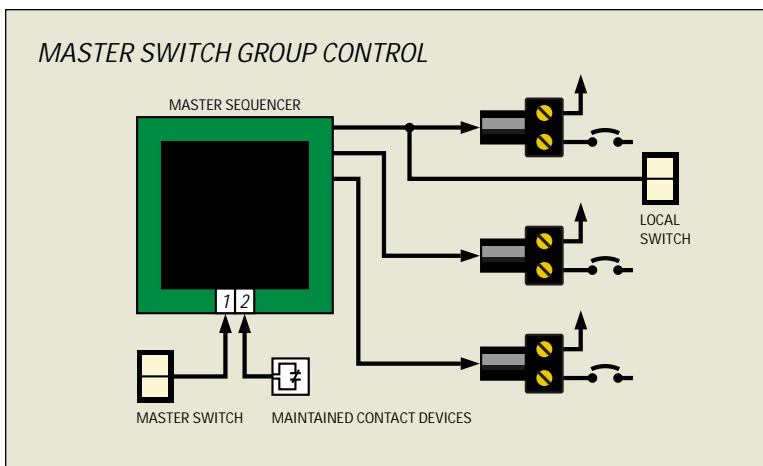
# Low-Voltage Switching



## Low-Voltage Switching Platform pages 6-15

The low-voltage switching platform consists of relay panels which are typically mounted in the electrical closet. Each lighting load to be controlled is wired through a relay. The relays, in turn, are connected to manual switches with low-voltage wires. The resulting switching platform has a number of benefits:

- Any number of switches can control a single relay. This makes it possible to control the lighting from any number of locations, including a central switching console.
- The status of each lighting load can be annunciated. This makes remote switching of lighting circuits code-compliant and practical.
- Relays can be grouped for common control. This provides a low cost, reconfigurable, multi-pole contactor function.
- Low-voltage wiring reduces wiring cost by eliminating the need for expensive conduit. This is especially important in long switch runs.



## Master Switch Control Of A Group Of Lighting Loads pages 16-17

Simple automation can be added to the basic switching platform using a Master Sequencer. This basic controller mounts on an accessory plate in the relay panel, controlling a group of relays ON/OFF while retaining separate control of each. When the Master Switch is turned ON (OFF), the Sequencer pulses each of its ON (OFF) relay outputs sequentially. A local switch can control an individual relay without affecting the others.

A second input channel allows timeclocks, building automation systems or other maintained contact devices also to control the Sequencer. This meets the minimum requirements of the energy codes. However, it requires multiple OFF sweeps of the timeclock to ensure that individual overrides are caught after four hours.

## Time Control Of Indoor Lighting pages 18-19

The Smart Sweeper provides a much more elegant solution for occupant-sensitive, indoor lighting automation. Like the Sequencer, it mounts on an accessory plate in the relay panel, with the timeclock or building automation system output wired to its input. When this contact is closed, the building is considered *occupied*; open, it's *unoccupied*.

This single contact can now initiate an intelligent operating scenario for all the connected lighting loads:

- Manual ON/Auto OFF
- Auto ON/Auto OFF

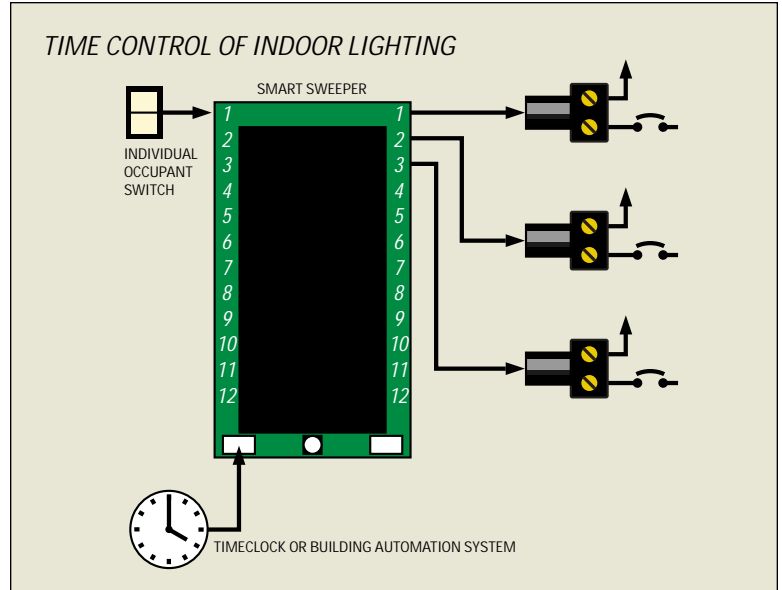
Contact Closed = Occupied Mode

The automation system closes the input contact before the earliest occupant arrives. In Auto ON scenario, the Sweeper will turn on the lighting when the contact closes. In Manual ON scenario, occupants switch on the lighting for their areas as they arrive.

Contact Open = Unoccupied Mode

Lights "blink" to warn occupants of an impending OFF sweep. Occupants can extend their stay, without having the lights go off, simply by pressing their switch. Areas not overridden go off in 5 minutes. At the end of the lighting override time (15 min. to 2 hr.) the Blink Warning process is repeated.

(Note: the Blink Warning, Time Delay and Auto ON vs. Manual ON are user selectable.)

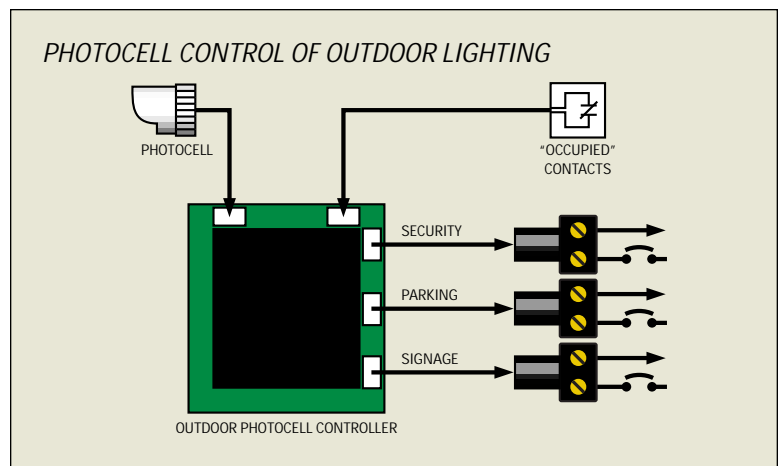


## Photocell Control Of Outdoor Lighting pages 20-21

The Outdoor Lighting Controller provides a simple way to control the three kinds of outdoor lighting normally encountered in a commercial or institutional building: Security, Parking and Signage. The controller itself is mounted in the relay panel; a single sensor is mounted outdoors.

As with the Sweeper, the Outdoor Lighting Controller uses a contact closure from the BAS, timeclock or security system to set the occupied/unoccupied status. Each type of lighting has its own output channel on the controller, with user-selectable trip levels:

- Security. The Security output controls the connected relays (up to 3) ON at dusk, OFF at dawn. The trip point is adjustable from 2 to 20 fc.
- Parking. Parking lot lights are turned on at dusk if the building is occupied. The lighting goes off when the building becomes unoccupied or the outdoor light level rises above the 2 to 20 fc threshold setting. A separate egress delay, adjustable from 15 to 120 min, allows a grace period for people to exit the building grounds.
- Signage. Signage is normally turned on at higher light levels: 20 to 200 fc. Signage is ON whenever the outside light levels are below this threshold and the building is occupied.



# Relays

**G**E RR SERIES RELAYS HAVE SERVED as the heart of low voltage lighting controls for over 40 years. The basic power switching device, the relay serves as the foundation of a building's lighting control solution.

GE's Remote Control panels and frames are configured for either RR7P or RR9P relays with a five-pin female connector. The user can simply remove a knockout in the low voltage barrier, snap the relay into place, and plug it onto the interconnect board.

### RR7P Operation

Each relay employs a split low-voltage (24V) coil to move the line voltage contact armature to the ON(OFF) latched position. As illustrated on the opposite page for the RR7P, the ON coil moves the armature to the left when a 24 volt 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:

- Positive action. The relay always goes to the state commanded. For example, multiple OFF commands will keep the contacts in the OFF position.
- Stable operation. Since the relay latches in the ON or OFF position, power outages do not result in a change of state.
- 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.

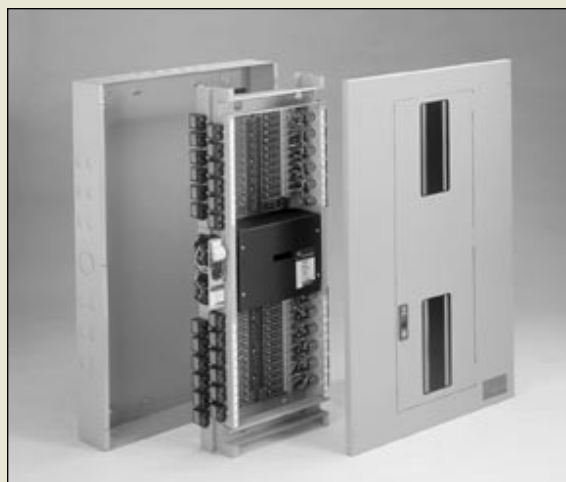
### RR9P Operation

The RR9P includes an auxiliary contact on the low-voltage side of the armature to provide status indication for pilot light switches or indicator lights for remote annunciation of lighting status. It is also used to provide status information to more highly automated GE TLC systems (refer to page 3 for overviews of other systems).



RR7P Relay

RR9P Relay



Catalog #	Description
RR7P	Standard 3-wire relay with 5-pin connector
RR9P	Isolated pilot contact 5-wire relay with 5-pin connector

The RR7P and RR9P relays are designed for simple connection to TLC panels. Other relay wire terminations are available, including:

RR7	Standard 3-wire relay with stripped leads
RR8	Pilot contact 4-wire relay with stripped leads
RR9	Isolated pilot contact 5-wire relay with stripped leads
RR7EZ	Standard 3-wire relay with spade terminals
RR8EZ	Pilot contact 4-wire relay with spade terminals
RR9EZ	Isolated pilot contact 5-wire relay with spade terminals

relays

**Specifications**

UL Listed, CSA Certified

Mounts in standard 1/2" KO, .865"-.875" diameter, 14 or 16 gauge material  
Operates in any position

**Rated Capacity**

Lamp Load – 20 A Tungsten filament 125 VAC  
20 A Ballast 277 VAC, 347 VAC Canadian  
Resistive Load – 20 A 277 VAC, 347 VAC Canadian  
Motor Load – 1/2Hp @ 110-125 VAC  
1/2Hp @ 220 - 277 VAC

**Operating Environment**

Temperature – 0 to 60°C (32 to 140°F)  
Relative Humidity – 10 to 95% RH, non-condensing  
Atmosphere – Non-explosive, non-corrosive  
Vibration – Stationary applications NEMA Level A

**Endurance**

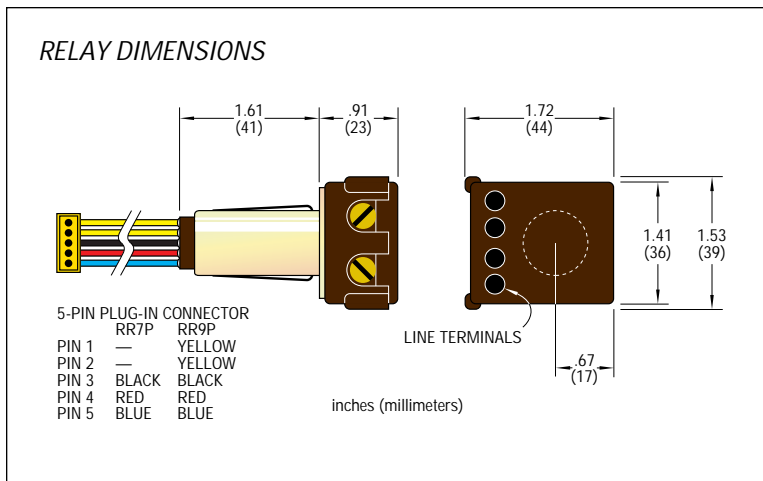
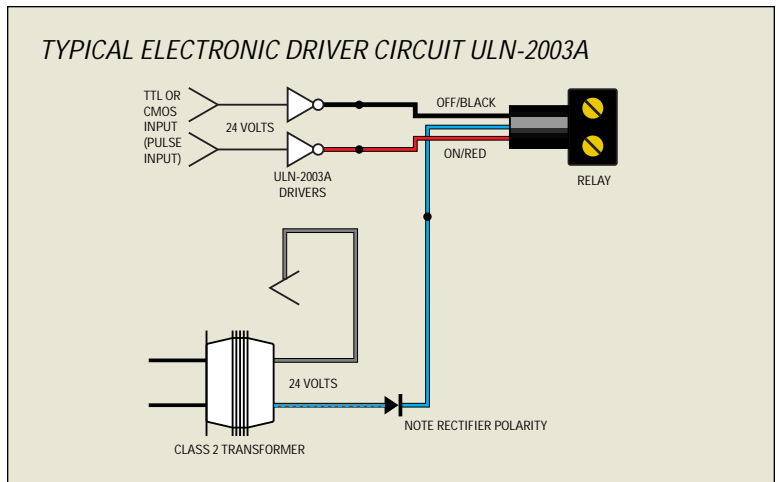
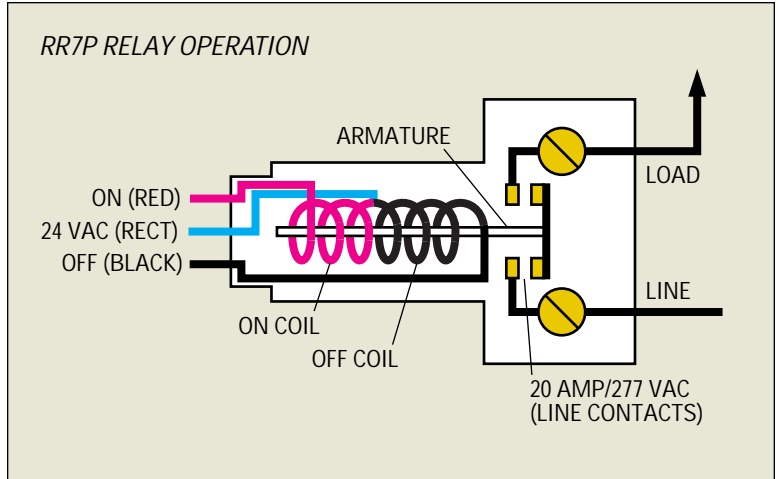
50,000 cycles, full load  
100,000 cycles, no load

**Line-Voltage Characteristics**

Contacts – SPST maintained (mechanical latching)  
Terminals – 2 Terminals  
2 Back-wiring holes per terminal  
Feedthrough wiring  
Screw actuated clamps for use with #14-10  
AWG solid or stranded copper wire only.

**Low-Voltage Characteristics**

Split Coil – 1/2 for "ON", 1/2 for "OFF"  
Compatible with standard interface/drivers, ULN-2003A Darlington transistor arrays  
Operating Voltage – Nominal  
24-29 VAC (±10%) Rectified (Minimum at relay = 21 VAC rectified)  
30-38 VDC (±10%) Filtered  
*Note: Do not use DC with pilot or locator switches*  
Duty Rating – Momentary  
Minimum Activating Pulse Time – 50 Milliseconds  
Coil Impedance – 75-85 Ohms at 60 Hz Unrectified  
55-60 Ohms DC Resistance  
Pilot Contact – 1 A 24-29 VAC Resistive



**Important Considerations and Restrictions**

**Relays connected in parallel** – Two or more relays connected in parallel, by grouping red leads and black leads, will operate together. The maximum number of relays connected in parallel is determined by the capacity of the power supply and the switch lead lengths. (See the table on page 13).

**Pilot contacts connected in parallel** – If the yellow switch connections for a group of RR9P relays are paralleled, any relay ON in the group will turn the pilot lighted switch ON.

**Caution:**

1 Do NOT use these relays to switch DC loads. This will damage the power contacts.

2 For proper pilot light operation, use only half-wave rectified AC voltage for relay control.

# 12-, 24- and 48-Relay Capacity Panels

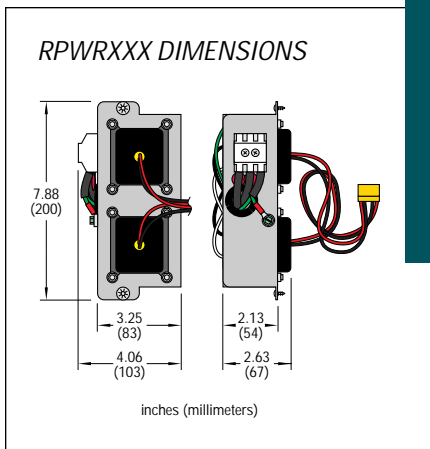
relay panels

**A** COMPLETE RELAY PANEL consists of a tub, interior with relays, power supply and cover. The tub is normally mounted in the electrical closet adjacent to the lighting panel.

Remote Control panel interiors provide isolation between line- and low-voltage sections of the panel, as well as the mounting frame for the relays, power supply and control devices. Interiors simply slide into the corresponding tub and bolt in place. Connections for plug-in relays and hardwired switches, as well as the rectifier, are included on the interior's motherboard.

Power supplies combine two separate 40 VA transformers in one assembly. They connect to the motherboard via a simple 5-pin connector. Power supplies available are: RPWR115 (115 VAC, UL/CSA), RPWR277 (277 VAC, UL/CSA) and RPWR347 (347 VAC, CSA, available in Canada only).

Standard covers are available as Surface Lockable (SL suffix) or Flush Lockable (FL suffix).



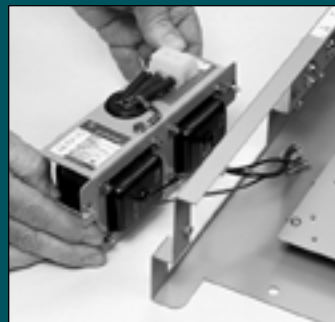
*Tub... Interior... Power Supply... Cover...  
For Easy Installation*



1. Mount tub



2. Pull wires



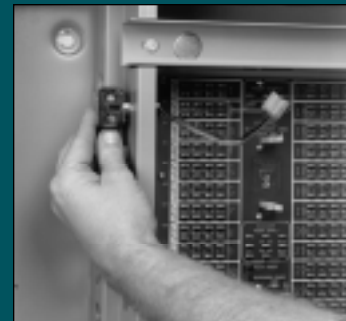
3. Connect power supply to interior



4. Insert interior into tub



5. Remove knockout plugs from panel.

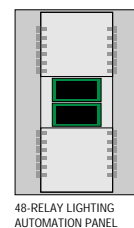
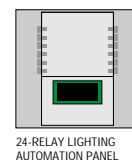


6. Snap in relays. Wire circuits.

**Maximum Panel Capacities**

Panel Size	12	24	48
RR7P/RR9P Relays	12	24	48
RMS8/16	2	4	4
RMS32	1	2	2
RSP12/RCS12*	1	2	2
RPCON/RPCON3-OUT	2	4	4

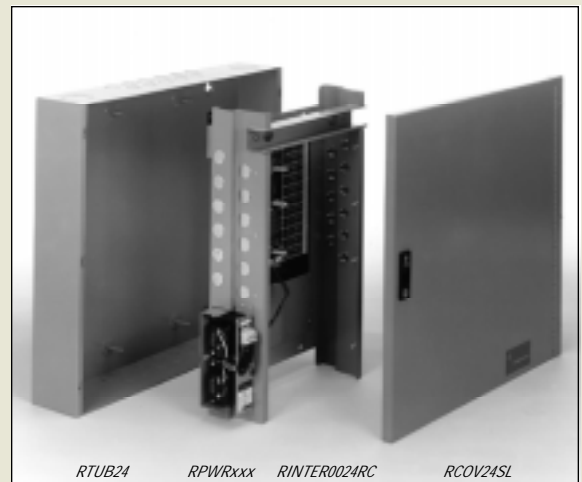
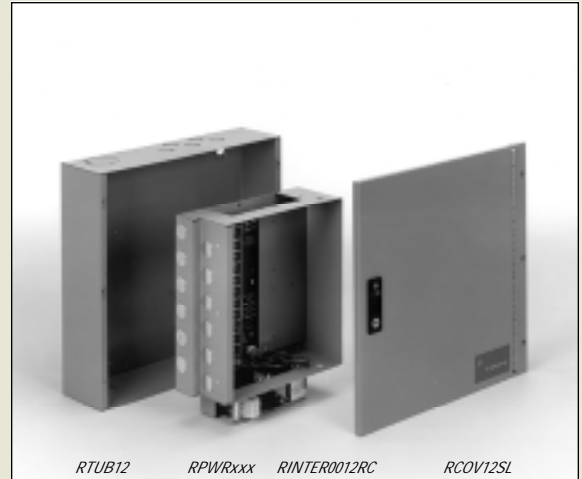
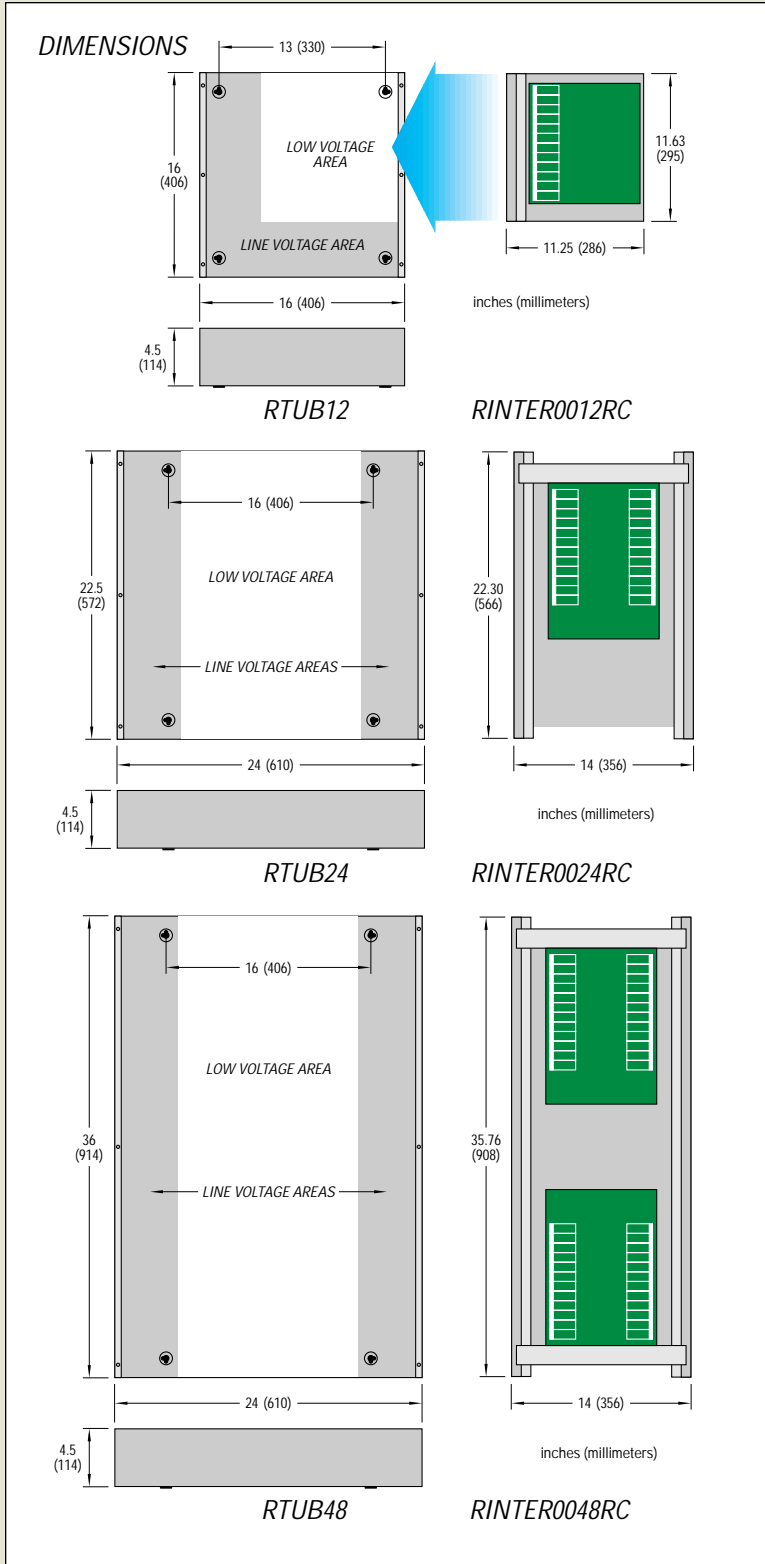
\* See Installation Table on page 19.





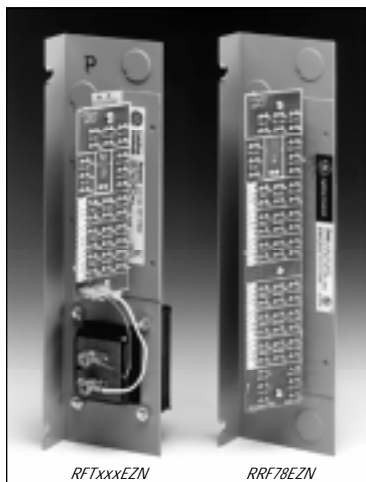
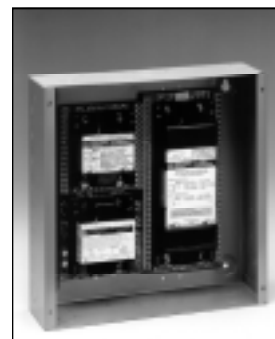
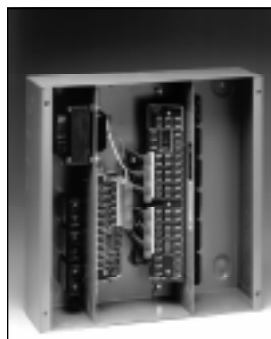
*Important Considerations And Restrictions*

When more than one transformer is used in accordance with US National Electric Code Section 725-32 and table 725-31(a) and control devices are operated by a common switch, connect the White low voltage secondary commons of both transformers by a common wire. Transformer primaries must be wired identically (correct polarity) to the same phase. Such installations are not permitted in Canada by Canadian Electric Code C22.1 subrule S 16-200 (4).



## Small Tubs and Frames

# tubs and frames



### Small Tub

The RBS2 small tub with surface-mount cover provides both a small relay panel and accessory enclosure. (Note: With screw cover only.)

### Frames

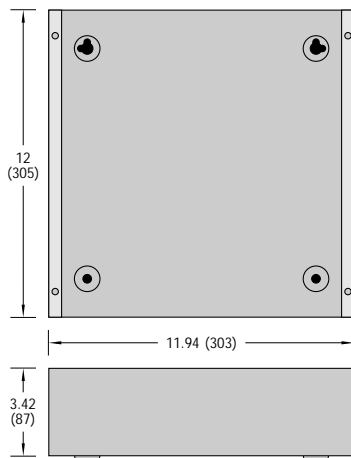
Two frames are available. The RFTxxxEZN frames combine a single transformer power supply and spaces for three plug-in relays; the RRF78EZN provides spaces for up to six relays.

### J-Box Mount

The RSENPWR-xxx J-Box cover mount provides a convenient method for installing remote relays or for providing a power pack for ceiling-mounted occupancy sensors. It mounts to a standard 4" x 4" or 4<sup>1</sup>/<sub>16</sub>" x 4<sup>1</sup>/<sub>16</sub>" electrical box.

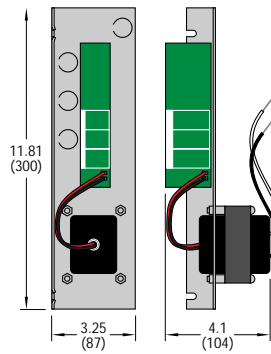


## DIMENSIONS



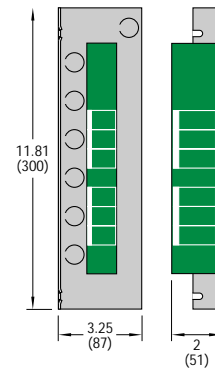
inches (millimeters)

**RBS2**



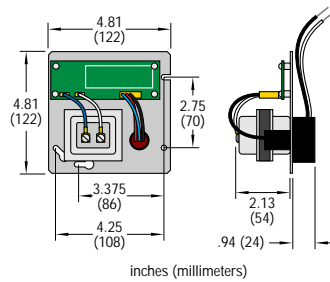
inches (millimeters)

**RFTxxxEZN**



inches (millimeters)

**RRF78EZN**



inches (millimeters)

**RSENPWR-xxx**

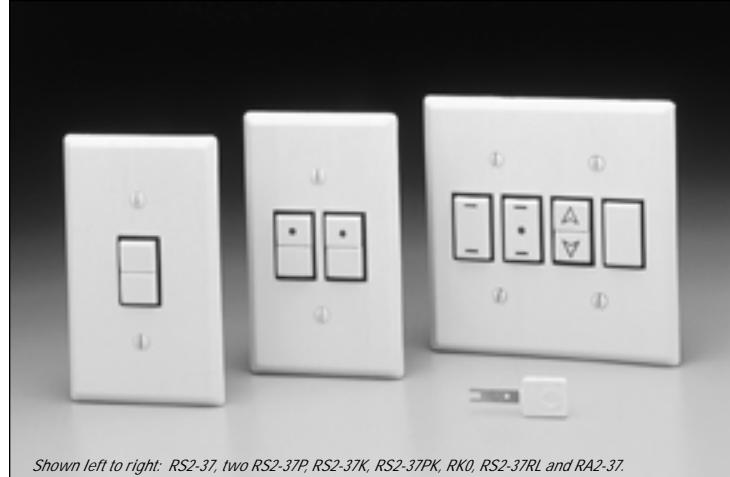
Catalog #	Description	Capacities
RBS2	Tub with surface-mount, shoebox cover	2 frames... or 1 frame and 2 RMS8/16, 2 RPCON, 2 RPCON3-OUT, 1 RMS32, 1 RCS12 or 1 RSP12... or No frame and 4 RMS8/16, 4 RPCON, 4 RPCON3-OUT, 2 RMS32, 2 RCS12 or 2 RSP12
RRF78EZN	6-relay frame UL, CSA Listed	Up to 6 plug-in relays Power tap for connecting to external power supply
RFT178EZN	3-relay frame with 115 VAC, 50-60 Hz transformer and rectifier UL, CSA Listed	Up to 3 plug-in relays Power tap for connecting to RRF78EZN Up to 8 sensors
RFT278EZN	Same as above with 277 VAC UL, CSA Listed	
RFT347EZN	Same as above with 347 VAC CSA Listed	Available in Canada only
RSENPWR-115	J-Box frame with 115 VAC, 50-60 Hz transformer and single RR7P relay UL, CSA Listed	1 RR7P relay and up to 4 occupancy sensors
RSENPWR-277	Same as above with 277 VAC UL, CSA Listed	
RSENPWR-347	Same as above with 347 VAC CSA Listed	Available in Canada only

# RS Series Momentary Switches

**M**ANUAL OVERRIDE SWITCHES are momentary, single-pole, double-throw devices wired to the relay using standard Class 2 control wiring. The RS2 series switches are designed for installation in mounting straps as shown or snap-in mounting in control panels (.76" x 1.28" rectangular hole required). They are available in three configurations:

1. Unlighted, 2-button
2. Locator lighted 2-button (0.03 amp, 28 VAC lamp)\*
3. Pilot lighted 2-button, red dot "ON" (0.04 amp, 28 VAC lamp)\*

For fast, trouble-free wiring, each switch is supplied with five 0.187" quick disconnect terminals. Matching blank fillers and pilot lighted blanks are also available.



Shown left to right: RS2-37, two RS2-37P, RS2-37K, RS2-37PK, RK0, RS2-37RL and RA2-37.

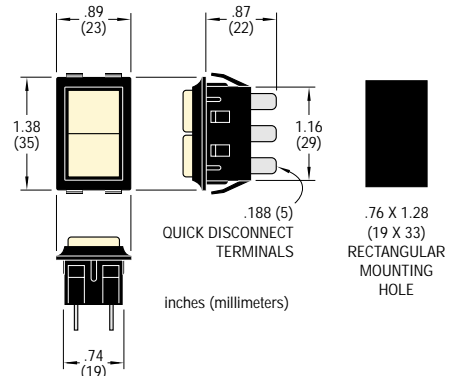
Catalog # Standard	Catalog # Key-operated*	Description	Button/Face Color (all have black collar)
RS2-32	RS2-32K	Unlighted	Ivory
RS2-37	RS2-37K	Unlighted	White
RS2-39	RS2-39K	Unlighted	Gray
RS2-32L	RS2-32LK	Locator Light	Ivory
RS2-37L	RS2-37LK	Locator Light	White
RS2-39L	RS2-39LK	Locator Light	Gray
RS2-32P	RS2-32PK	Pilot Light	Ivory/Red Dot
RS2-37P	RS2-37PK	Pilot Light	White/Red Dot
RS2-38P		Pilot Light	Red/Black Dot
RS2-38PA		Pilot Light	Clear Red
RS2-39P	RS2-39PK	Pilot Light	Gray/Red Dot
RS2-32RL	RS2-32RLK	Raise/Lower	Ivory/Red Arrows
RS2-37RL	RS2-37RLK	Raise/Lower	White/Red Arrows
RS2-39RL	RS2-39RLK	Raise/Lower	Gray/Red Arrows
RK0		Replacement Key for K-suffix switches	
RA2-32		Blank Filler	Ivory Face
RA2-37		Blank Filler	White Face
RA2-39		Blank Filler	Gray Face
RA2-38P		Pilot Light Blank	Red Lens

\*Key operated switches are supplied with 2 RK0 keys.

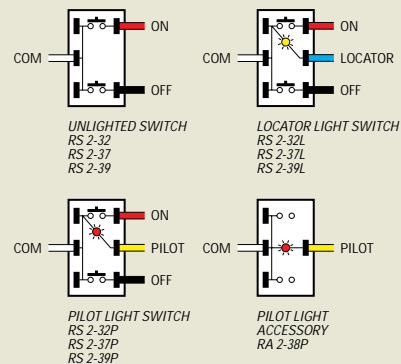
For heavy-duty conventional-style toggle switches, see page 15.

\* NOTE: Lamps are rated at 50,000 hours when using half-wave rectified power supply. Lamps are NOT replaceable.

## RS2 SERIES SWITCH TYPICAL DIMENSIONS



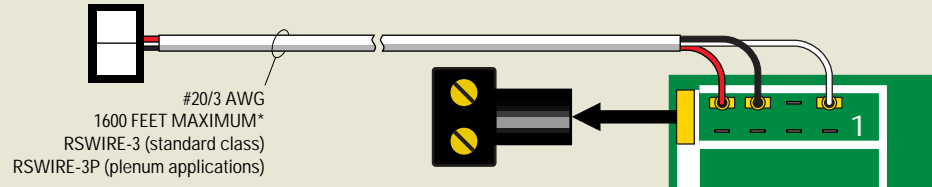
## SWITCH WIRING (BACK VIEWS)



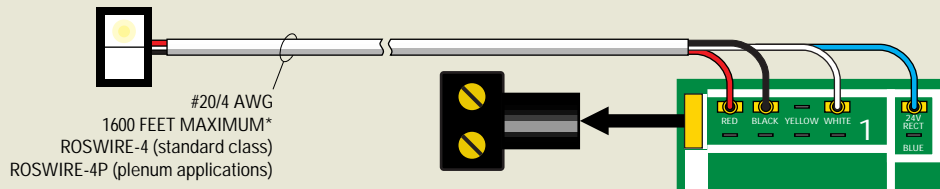
Switches

## LOW VOLTAGE SWITCHES – TYPICAL WIRING

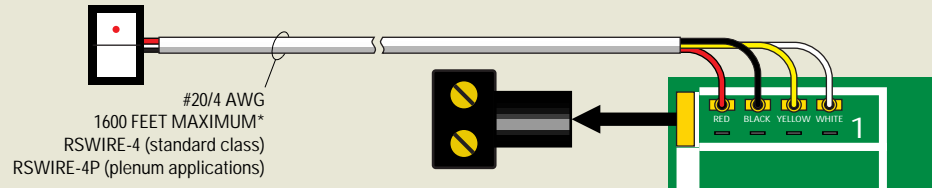
### STANDARD SWITCH



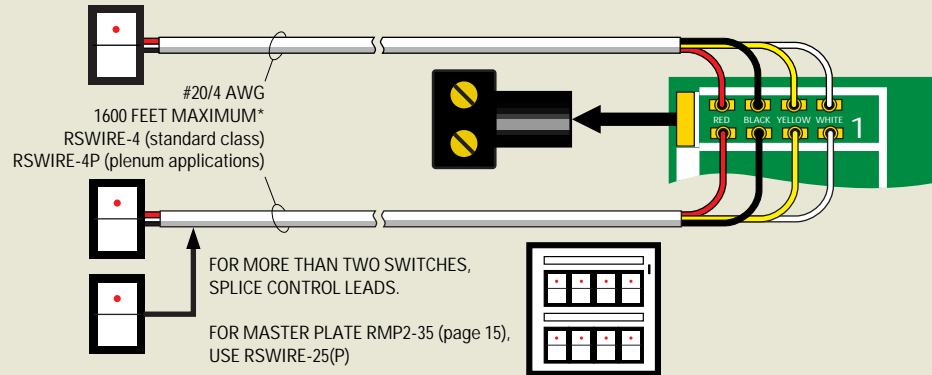
### LOCATOR LIGHT SWITCH



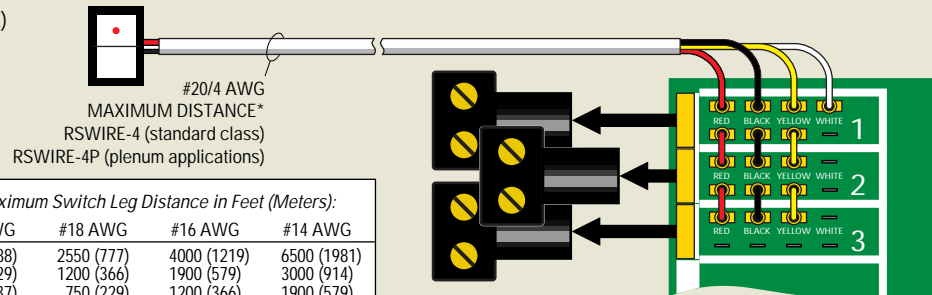
### PILOT LIGHT SWITCH



### MULTIPLE SWITCH CONTROL OF A SINGLE RELAY



### SINGLE (OR MULTIPLE) SWITCH CONTROL OF A GROUP OF RELAYS



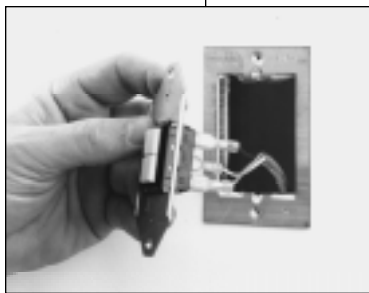
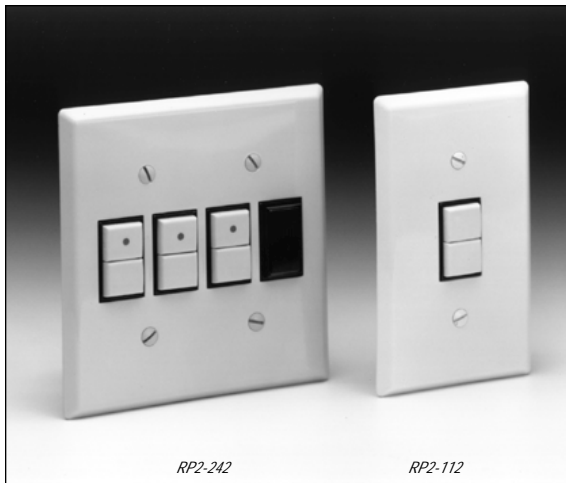
Number of Relays in Parallel	*Maximum Switch Leg Distance in Feet (Meters):			
	#20 AWG	#18 AWG	#16 AWG	#14 AWG
1	1600 (488)	2550 (777)	4000 (1219)	6500 (1981)
2	750 (229)	1200 (366)	1900 (579)	3000 (914)
3	450 (137)	750 (229)	1200 (366)	1900 (579)
4	325 (99)	500 (152)	825 (251)	1300 (396)
5	240 (73)	375 (114)	600 (183)	950 (290)
6	180 (55)	300 (91)	450 (137)	725 (221)
7	140 (43)	225 (69)	350 (107)	650 (198)
8	110 (34)	175 (53)	275 (84)	450 (137)

For more than 6 relays in parallel, use a Master Sequencer (RMS8, RMS16 or RMS32).

Note: Relays 1, 2 and 3 are now permanently wired as a group. You can't control them individually. If the pilot contacts are wired in parallel as shown, turning ON any relay in the group will cause the pilot to light.\*\*

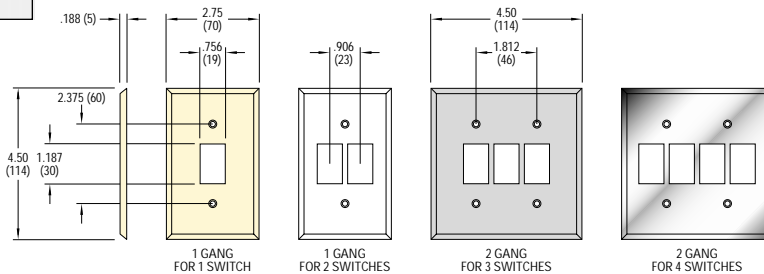
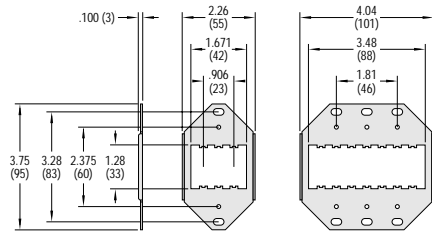
# Switch Plates and Brackets

**S**TANDARD SWITCH PLATES are available in single-gang size for one or two RS2 series switches or RA2 series accessories, and 2-gang size for three or four switches or accessories. They come in ivory, white or gray nylon and 302 stainless steel. Switches and accessories snap into a metal bracket (included with each RP2 plate) which mounts to a standard single- or 2-gang wallbox. Single-gang plates are furnished with an RPB2-1 bracket and 2-gang plates with an RPB2-2 bracket. All necessary mounting screws are included.



**RP2 SERIES SWITCH PLATE AND RPB2 SERIES BRACKET DIMENSIONS**

Catalog #	Description	Color / Material
<b>Switch Plates</b>		
RP2-112	1-Gang for 1 Switch	Ivory Nylon
RP2-116	1-Gang for 1 Switch	Stainless Steel
RP2-117	1-Gang for 1 Switch	White Nylon
RP2-119	1-Gang for 1 Switch	Gray Nylon
RP2-122	1-Gang for 2 Switches	Ivory Nylon
RP2-126	1-Gang for 2 Switches	Stainless Steel
RP2-127	1-Gang for 2 Switches	White Nylon
RP2-129	1-Gang for 2 Switches	Gray Nylon
RP2-232	2-Gang for 3 Switches	Ivory Nylon
RP2-236	2-Gang for 3 Switches	Stainless Steel
RP2-237	2-Gang for 3 Switches	White Nylon
RP2-239	2-Gang for 3 Switches	Gray Nylon
RP2-242	2-Gang for 4 Switches	Ivory Nylon
RP2-246	2-Gang for 4 Switches	Stainless Steel
RP2-247	2-Gang for 4 Switches	White Nylon
RP2-249	2-Gang for 4 Switches	Gray Nylon
<b>Brackets</b>		
RPB2-1	1-Gang for 1 or 2 Switches	Steel
RPB2-2	2-Gang for 3 or 4 Switches	Steel



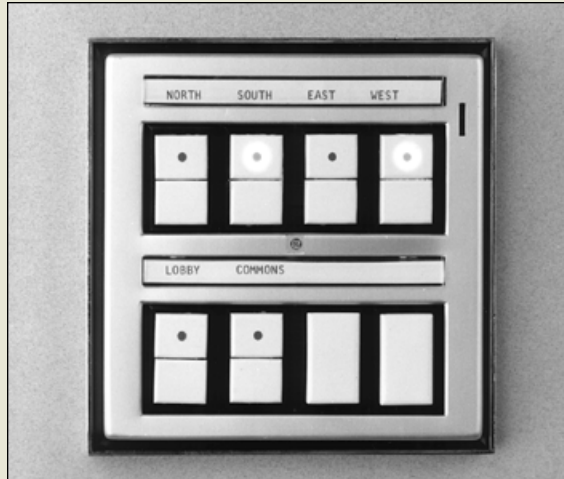
ALL DIMENSIONS ARE TYPICAL  
inches (millimeters)

switch plates

## Master Plate

The RMP2-35 Master Plate conveniently mounts eight RS2 series switches and/or RA2 series accessories. The satin-finish, anodized aluminum frame mounts on a zinc die-cast base. A key-operated lockout switch is located in the unit to allow the switches to be deactivated. One RK1 key is included with the plate. For typical lockout circuit wiring diagrams, phone 1-877-584-2685 in the (USA) and (CANADA). The Master Plate mounts directly on a 4<sup>11/16</sup>" x 4<sup>11/16</sup>" square box using the "S" bracket packed with the unit. (It may NOT be mounted on a 4" square box).

Catalog #	Description	Color
RMP2-35	8-Switch Master Plate	Aluminum with Black Trim
RK1	Replacement Key (1 furnished with unit)	



## Heavy-Duty Toggle Switches

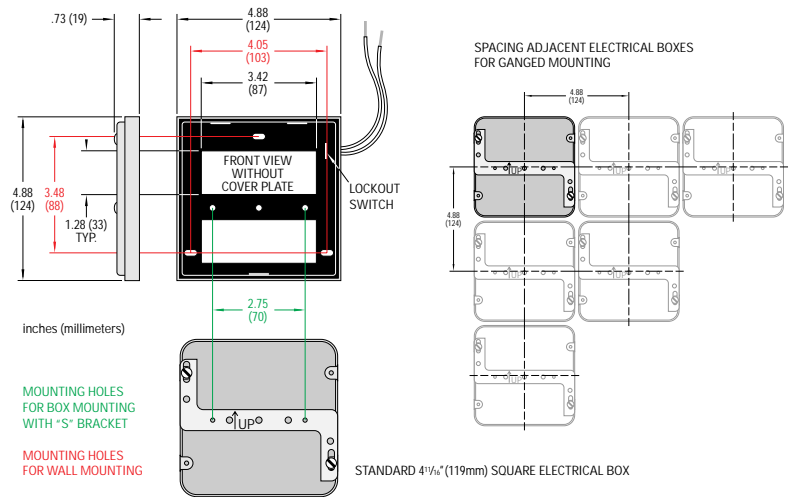
The GE 5935 series single-pole, double-throw, center OFF, momentary switches allow the designer to match the appearance of conventional switches. The devices are rated at 15 Amp, 277 VAC and require a standard switch plate, which is not included.

Catalog #	Description / Toggle Color
GE 5935-1G	Brown
GE 5935-2G	Ivory
GE 5935-7G	White
GE 5935-9G	Gray
GE 5935-0LG	Locking Switch with 2 Keys
GE 5099-0	Replacement Key for GE 5935-0LG

The GE 5935 Series does not offer pilot light or locator light versions.



## RMP2-35 MASTER PLATE DIMENSIONS



# Master Sequencers

## Relay Group Control

# sequencer

**T**HE RMS MASTER SEQUENCER provides a master ON/OFF function for a group of relays while retaining individual relay control.

This is a basic building block for automation. A group of lighting circuits, such as all general office lighting, may be turned OFF at the end of the day while allowing an individual to override a particular area back ON with a local switch.

The Master Sequencer is an electronic switch with two independent inputs. It is available in three sizes allowing independent ON/OFF control of 8, 16 or 32 relays. In addition to master group control, it also allows switchleg extension and the conversion of maintained input signals to momentary.

### Master Group Control

The RMS turns each associated relay ON or OFF, one at a time, when it detects a change of state of a switch input. When the ON side of a master switch is actuated, the RMS detects this action and provides a pulse to each of its ON output terminals in rapid succession (1-4 seconds). Since each relay output is pulsed individually, a large number of relays can be controlled as part of each master group.

### Master Switchleg Extension

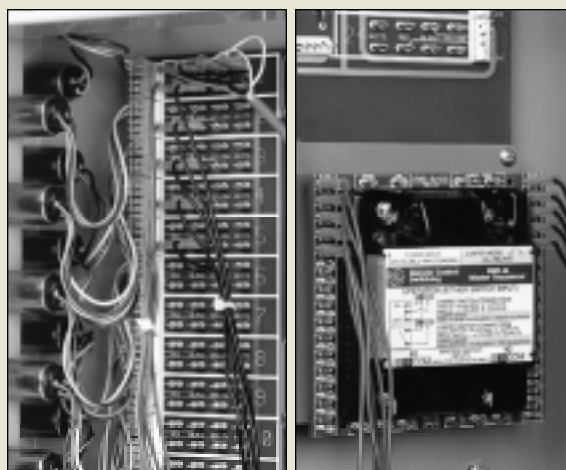
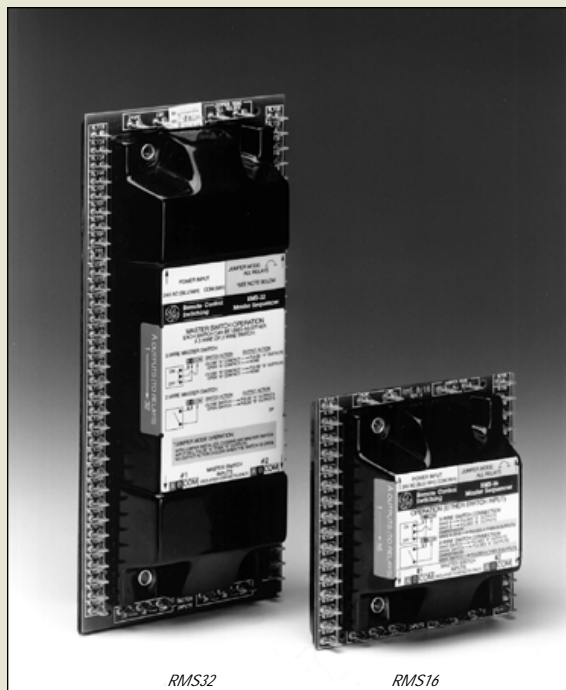
When relays are paralleled to create a group (see bottom diagram on page 13), the switchleg length must be restricted because of voltage drop. This restriction does not apply to the RMS. A master switch may be up to 1000 feet from the RMS, regardless of the number of relays controlled by the unit.

### Maintained-To-Momentary Input Conversion

Each input channel on the RMS will accept any number of 3-wire momentary switches, one 3-wire maintained switch or one 2-wire SPST switch. This allows the RMS to interface directly with typical control devices, such as timeclocks, while still providing local master switch control.

### ON/OFF Operation

A mode jumper allows the RMS to be used as an ON/OFF master controller or as an ON or OFF device similar to the old GE Motor Master (RMS5BL or RMS5RL). In the ON/OFF mode, either master switch controls the relays both ON and OFF. The ON (red) leads connect to the "A" output bank (left side) and to the red terminals of the relays to be controlled;



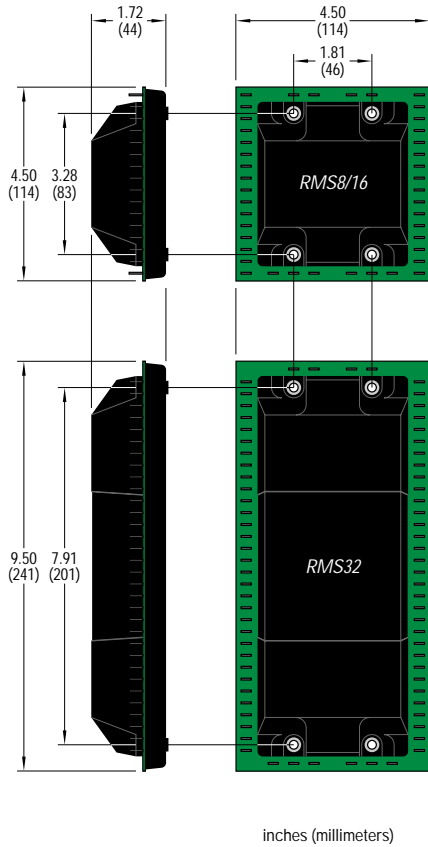
the OFF (black) leads connect to the "B" output bank (right side) and to the black relay terminals (see photos and Typical Wiring diagram opposite).

### ON Or OFF Only

In the ON or OFF Only mode, actuating either master switch pulses both the A and B output banks. For Master OFF Only control, the black relay leads connect to both A and B outputs, doubling the capacity of the unit.



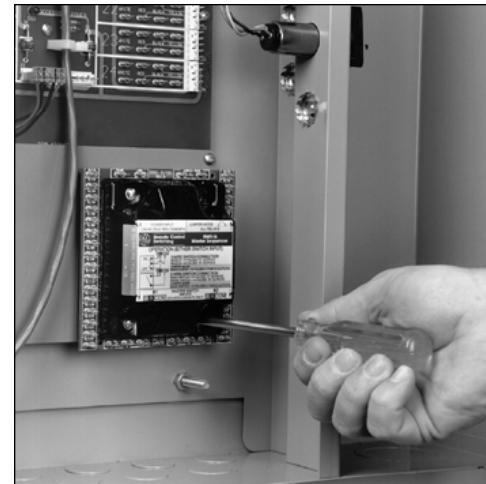
### RMS DIMENSIONS



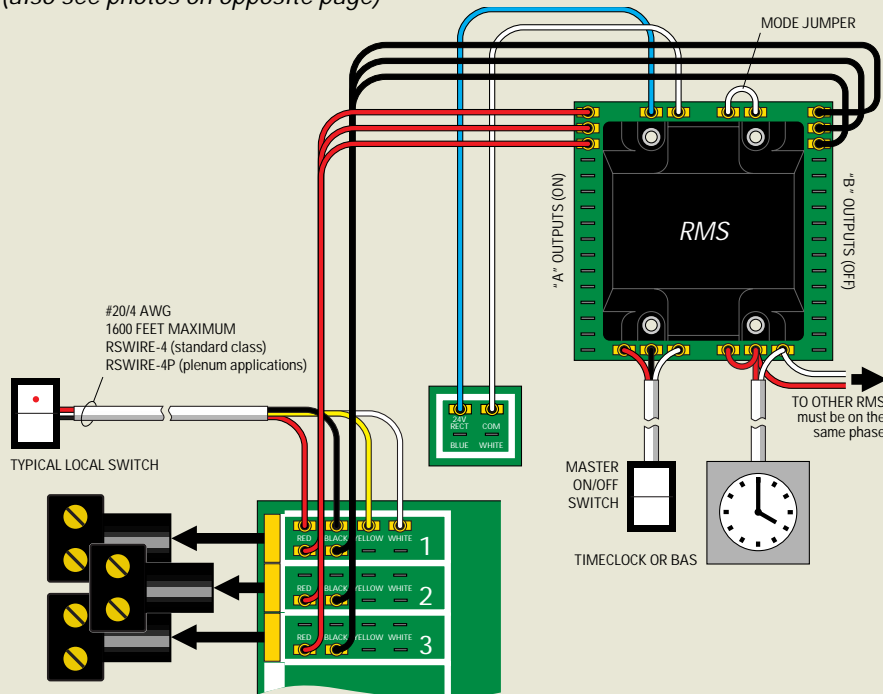
Catalog #	Description	Specifications
RMS8	Master Sequencer for Controlling up to 8 Relays ON/OFF	24-29 VAC + 10%, 2 VA ON/OFF Mode: 8 ON Outputs, 8 OFF Outputs OFF Only (ON Only) Mode: 16 Outputs Up to 3 Relays per Output 0 to 55°C (32 to 131°F) Indoor applications, <1 second cycle time
RMS16	Master Sequencer for Controlling up to 16 Relays ON/OFF	24-29 VAC + 10%, 2 VA ON/OFF Mode: 16 ON Outputs, 16 OFF Outputs OFF Only (ON Only) Mode: 32 Outputs Up to 3 Relays per Output 0 to 55°C (32 to 131°F) Indoor applications, 1.7 second cycle time
RMS32	Master Sequencer for Controlling up to 32 Relays ON/OFF	24-29 VAC + 10%, 2 VA ON/OFF Mode: 32 ON Outputs, 32 OFF Outputs OFF Only (ON Only) Mode: 64 Outputs Up to 3 Relays per Output 0 to 55°C (32 to 131°F) Indoor applications, 3.3 second cycle time

### RMS Installation

The RMS mounts in standard panels and cabinets and does not require special orientation.



### RMS MASTER SEQUENCER TYPICAL WIRING (also see photos on opposite page)



# Smart Sweeper

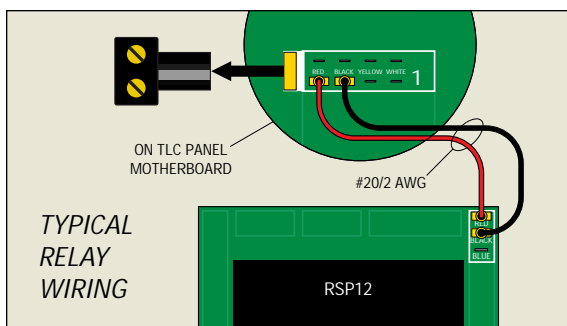
## Auto OFF with Blink Warning

**T**HE RSP12 REMOTE CONTROL SMART SWEEPER takes the concept of the Master Sequencer one step further. Like the RMS, the Sweeper allows groups of lighting circuits to be turned ON or OFF automatically, allows switchleg extension, and converts maintained input signals to momentary. However, the Sweeper is designed with a higher level of intelligence, reducing hardwiring for specific functions and increasing flexibility.

An “Occupied” contact simplifies scheduling and enables several powerful automation functions, including automatic ON, after-hours OFF sweeps based on a user-selectable time delay, and blink warning. The Sweeper, designed for applications like general lighting in a small office building, provides users with automatic functions for energy savings while allowing individual occupant control.

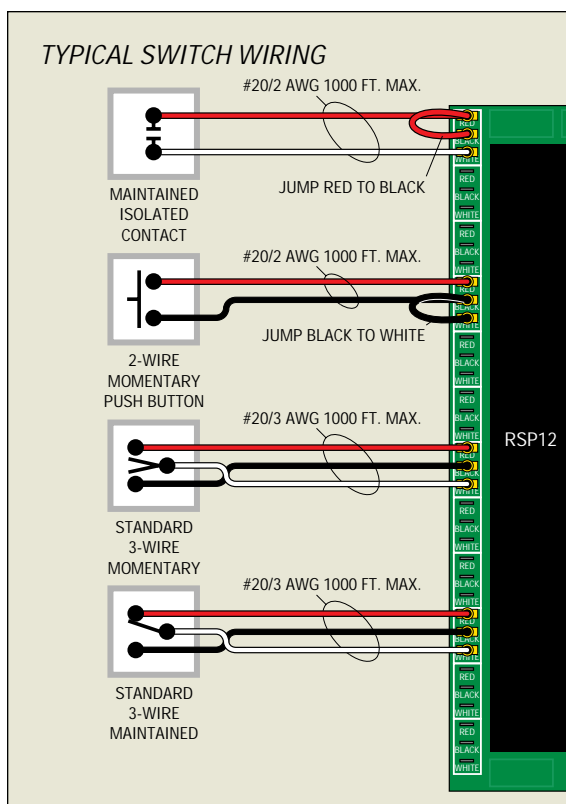
Because it offers more functions, the Sweeper is configured differently than the RMS. The Sweeper provides one master input, and 12 individual switch inputs. Each input will accept any 2- or 3-wire switch, including a 2-wire maintained input (refer to Typical Switch Wiring diagram on opposite page). Inputs may also be wired together for control of small subgroups.

Each of the 12 individual inputs corresponds to one of the 12 relay outputs, allowing direct occupant override for any relay.

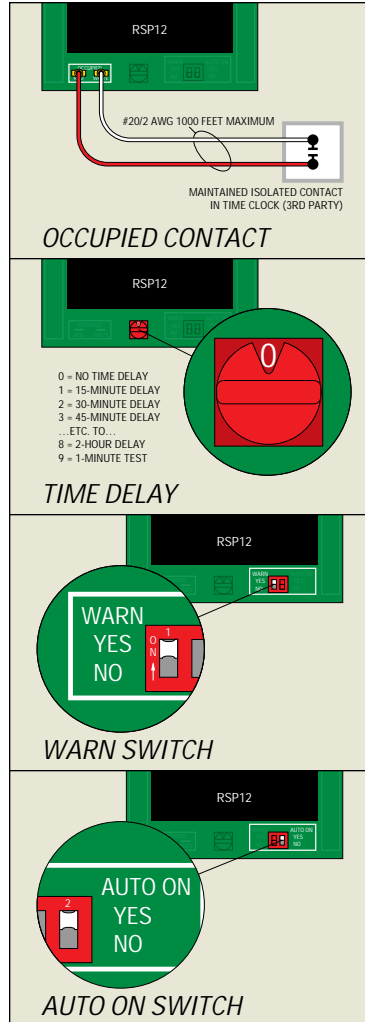
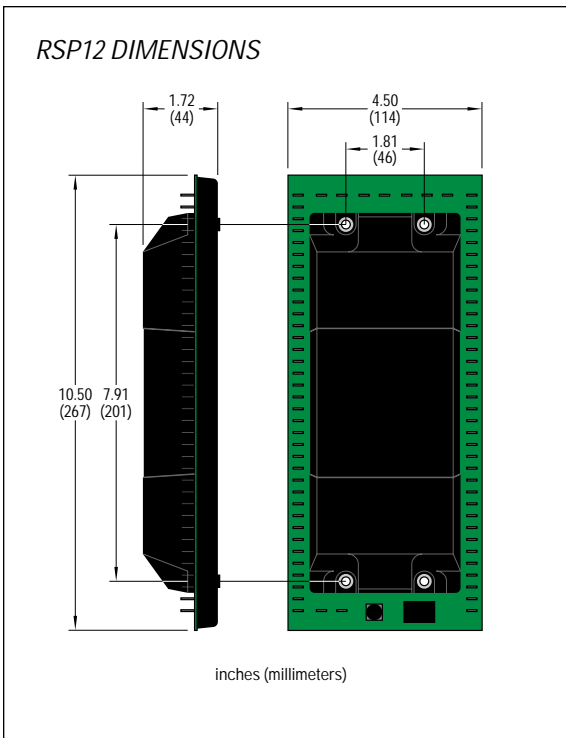
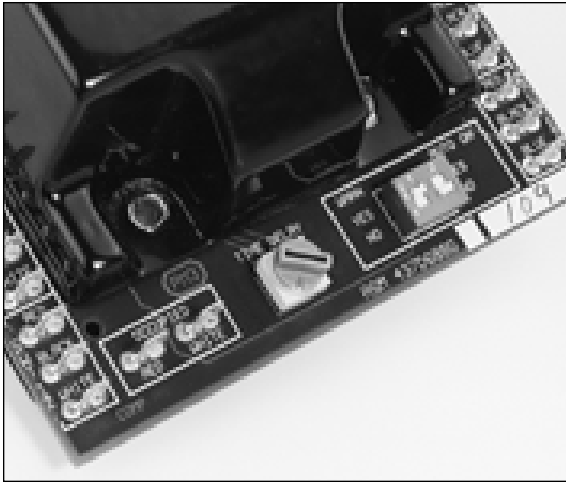


### Maintained-To-Momentary Interface

The RCS12 Switch Interface is identical in form to the RSP12. Without any advanced control functions, however, the RCS12 simply converts any switch input to a momentary output. Relay outputs can drive up to three relays wired in parallel.



Sweeper



### Occupied Contact

A timeclock or BAS can easily interface to the Sweeper using the Occupied contact. The contact is CLOSED to indicate normal working hours for the building, then OPEN after hours. Properly connecting and scheduling the Occupied contact determines when other functions will be enabled. If an automated interface is not required, the Occupied contact may simply be connected to a manual switch.

### Time Delay

Many energy codes require automatic OFF of any lighting turned on after hours. The Sweeper provides a selectable delay in 15-minute increments up to two hours. When the option is selected, an occupant's after-hours override will be turned OFF automatically after the selected time. Each override carries its own delay, so occupants in different areas of the building aren't affected by activity in other zones.

### Blink Warning

When lighting is due to be turned OFF, either at the end of normal working hours or at the end of a timed override, the Sweeper can warn the occupants by blinking the lights five minutes in advance, giving anyone still in the building time to override the system for his area.

### Auto ON

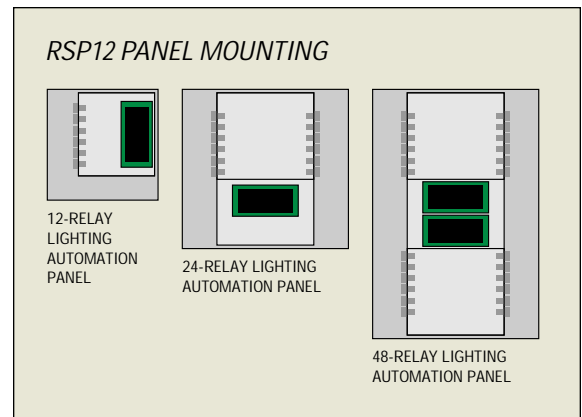
Lighting can be turned ON automatically at the start of normal working hours (when the Occupied contact closes) by setting the Auto ON switch to "Yes". When Auto ON is set to "No", arriving occupants must switch the lights on manually.

Catalog #	Description	Specifications
RSP12	Smart Sweeper for Automating up to 12 Relays ON/OFF Switching plus Advanced Control Functions	24-29 VAC + 10%, 1 VA 12 Switch Inputs plus 1 Master Input 12 Relay Outputs (up to 3 relays per output) 0 to 55°C (32 to 131°F) Indoor applications, 1.5 seconds cycle time
RCS12	Remote Control Switch Converter for Converting Any Switch Input to Momentary Output	24-29 VAC + 10%, 1 VA 12 Switch Inputs plus 1 Master Input 12 Relay Outputs (up to 3 relays per output) 0 to 55°C (32 to 131°F) Indoor applications, 1.5 seconds cycle time

### Installation

The RSP12 or RCS12 should be installed in a lighting automation panel or an accessory cabinet. While two units may be stacked on top of each other inside the lighting automation panel, wiring becomes complex. GE recommends typical installations as follows:

- 12 relays: 12-relay panel with one RSP12/RCS12 mounted in the panel
- 24 relays: 24-relay panel with one RSP12/RCS12 in the panel and one in accessory cabinet
- 48 relays: 48-relay panel with two RSP12/RCS12 in the panel and two more in accessory cabinet



## Outdoor Lighting Controller

**F**OR A SMALL OFFICE OR RETAIL STORE, the most common outdoor lighting needs include security lighting, parking lot and signage. All three types can be easily automated using a combination of a photosensor to detect outdoor light levels and the RPCON3-OUT Outdoor Lighting Controller.

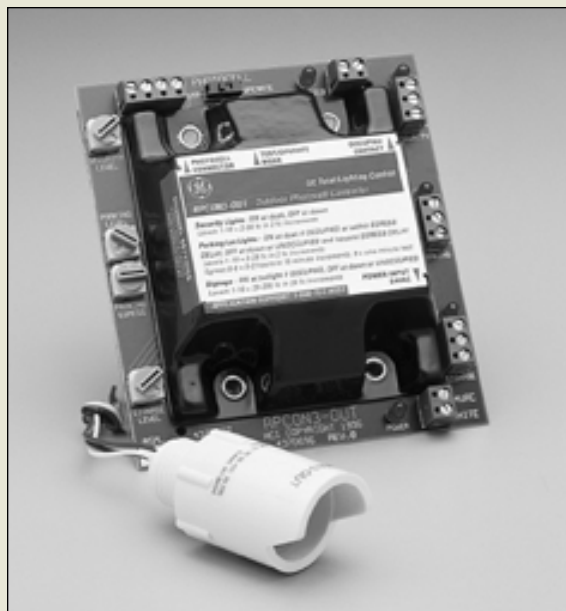
Like the Sweeper, the Outdoor Lighting Controller uses an “Occupied” contact to interface to a timeclock, BAS or simple switch. The controller combines daylight information gathered from the photosensor and occupancy information from the “Occupied” contact to turn exterior lighting ON or OFF at the appropriate times. For example, a retail store may need security lighting to turn on whenever it is sufficiently dark outside, whether or not the store is open. However, even after dark, signage should only turn on when the store is ready for business. The RPCON3-OUT is designed to simplify these decisions for the owner and installer, taking the complexity out of outdoor lighting control.

### Daylight Input

The RPCON3-OUT controller must be used with the RPSEN3-OUT photosensor. For convenience, the two products may be ordered as a package under the catalog number RPHOTO3-OUT. The photosensor head is mounted on the building roof facing the northern sky, and wired back to the controller to provide information on the level of daylight outside.

### Intelligent Outputs

The controller’s three independent outputs are each capable of driving up to three relays wired in parallel. They may also drive other smart inputs, which include a master input on another controller such as the RMS or Sweeper, or the channels of a GE Softwired Contactor panel. (Call 1-877-584-2685 for more details on using the Outdoor Lighting Controller with the Softwired Contactor).



Each output is dedicated to one type of outdoor lighting: Security, Parking and Signage. Each output has its own adjustable set point to indicate what level of daylight (or darkness) should trip the lighting ON. The user may adjust settings simply by turning the dial. An automatic “deadband” and a five-minute time delay help eliminate nuisance switching (time delay can be bypassed for setup and testing).

### Parking Lot Egress Delay

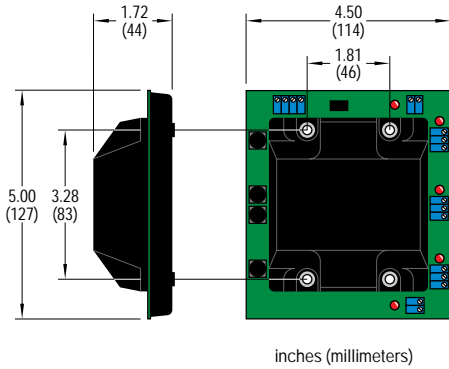
If the owner chooses, the parking lot lighting will stay on for a set time after closing to allow customers and employees time to depart safely. The egress delay for parking lot lighting can be set in 15-minute increments up to 2 hours.

### Smart Scenarios

Smart scenarios built into the RPCON3-OUT control the three outputs as follows:

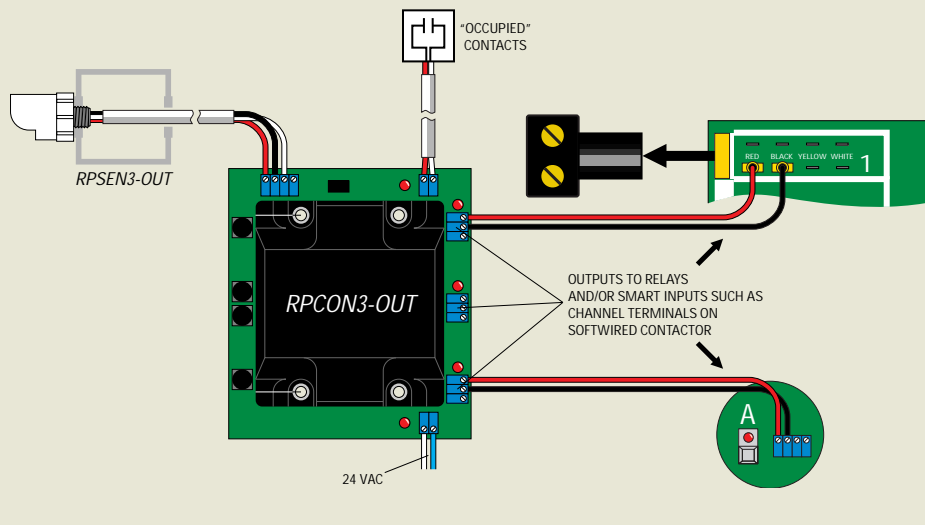
- Security – ON at dusk, OFF at dawn. This output always follows the photosensor.
- Parking – Follows the photosensor while “Occupied.” Going “Unoccupied” causes the unit to turn the lights OFF after the egress time delay has elapsed.
- Signage – Also follows the photosensor while “Occupied.” Going “Unoccupied” immediately turns the lights OFF with no time delay.

### RPCON3-OUT DIMENSIONS

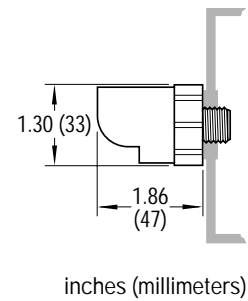


Catalog #	Description	Specifications
RPCON3-OUT	Outdoor Lighting Controller with Built-in Scenarios and Three Outputs for Security, Parking and Signage Lighting	24-29 VAC/VDC $\pm$ 10%, 1 VA Sensor Input: 3 #20 AWG Wires 3 Intelligent Outputs Up to 3 Relays or 1 Smart Input per Output 0 to 55°C (32 to 131°F) Controller mounts indoors Range (fc) – user selectable per output: 2-20 fc (Security and Parking) 20-200 fc (Signage) Deadband: 6 fc (Security and Parking) 4 fc (Signage)
RPSEN3-OUT	Outdoor Photodiode Sensing Module	Weatherproof, -30 to 50°C (-20 to 120°F) ½" MPT, facing north
RPHOTO3-OUT	Package – Outdoor Lighting Controller (RPCON3-OUT) with Photosensor (RPSEN3-OUT)	

### RPCON3-OUT AND RPSEN3-OUT TYPICAL WIRING



### RPSEN3-OUT DIMENSIONS



## Daylighting Controls

# T

LC DAYLIGHTING CONTROLS PROVIDE:

- A reliable switching system for each type of daylight space.
- Easy calibration and stability over time.
- Simple integration with the lighting control panels and switches.

### Sensors For A Variety Of Space Needs

TLC uses four different photosensors to meet the needs of the space and provide a very stable signal:

- Interior Space with Daylighting – RPSEN-IN  
Interior spaces with windows providing abundant daylight require a sensor capable of tracking the lighting falling onto the workspace. Direct lighting from the window must be excluded. Switching ranges must correspond to typical office lighting levels of 30 to 70 fc. The sensor sheds lamps based on adequate daylighting, reducing lighting levels until the sensor activates the lamps ON again.
- Atrium Spaces – RPSEN-ATR  
Atriums, areas with multi-story glass expanses, provide higher daylighting levels than in a typical perimeter office space. To control lighting effectively within atrium spaces, the sensor must average the brightness of the ceiling without being exposed to direct daylight. On dark or rainy days the lighting should be left ON. This requires a switching range of 100 to 1,000 fc.
- Interior Spaces with Skylights – RPSEN-SKY  
While similar to atriums, the physical layout requires sensors in these spaces to be mounted in the skylight, facing upward. Exposing the sensor to direct daylighting requires switching levels of 1,000 to 10,000 fc.
- Exterior Lighting – RPSEN-OUT  
The RPSEN-OUT is designed for exterior mounting facing north to provide a signal for switching exterior lighting. It should not be confused with the RPSEN3-OUT photosensor, as described on page 20, which is used ONLY with the RPCON3-OUT controller.

### Controller

The RPCON control unit is normally mounted in the electrical closet with the relay panel to simplify calibration. The installer selects the switching range and then enters the high and low setpoints of the deadband, which is needed to avoid an oscillating condition. Meters and calibration charts are not required. In normal operation, the controller has a 3-minute time delay to eliminate nuisance switching. Time delay can be bypassed for setup and testing.

### Integration And Occupant Overrides

The photocell controller provides three independent outputs which may be connected directly to relays or to another controller such as the Master Sequencer or Sweeper. Individual override switches may be connected to each relay, or a master switch may be added to provide manual override of all three outputs. A separate Photocell Enable/Disable input allows the daylighting function to be disallowed during unoccupied periods.



RPCON shown with RPSEN-ATR

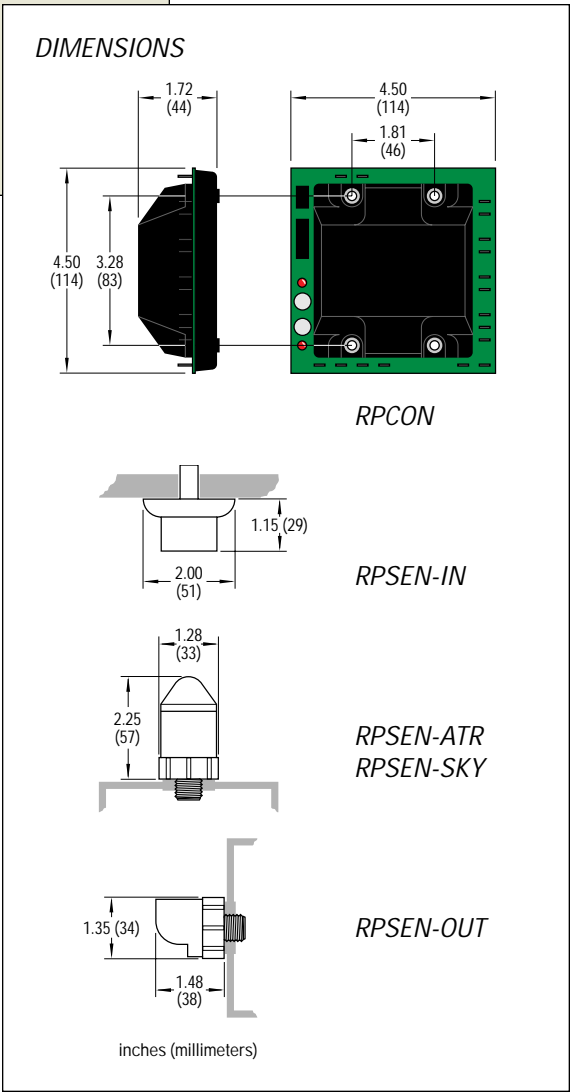
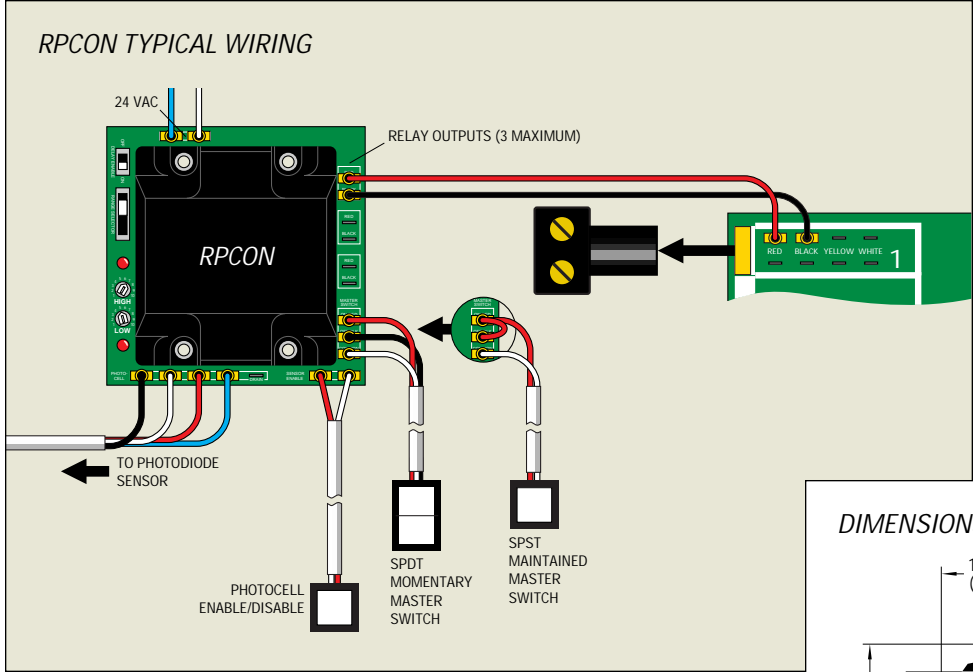


RPSEN-SKY

RPSEN-OUT

RPSEN-IN

photocell



Catalog #	Description	Specifications
RPCON	Photocell Controller for use with Photosensors below	24-29 VAC + 10%, 2 VA Sensor Input: 4 #20 AWG Wires (plus shield for noisy environments) Control Inputs: Maintained Photocell Enable and Maintained or Momentary Master Override Input Delay: 3 Minutes (with override for testing) Pulse Outputs: 3 Isolated Dry Contacts Range Selector (fc): 1-10, 10-100, 100-1,000, 1,000-10,000 Adjustments: Low and High Setpoints on Deadband with LED Indication

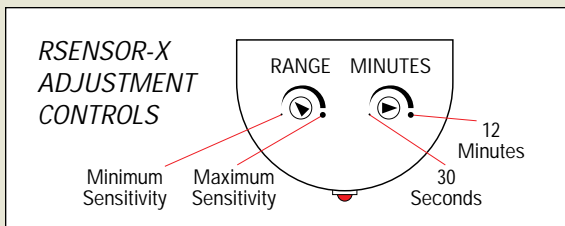
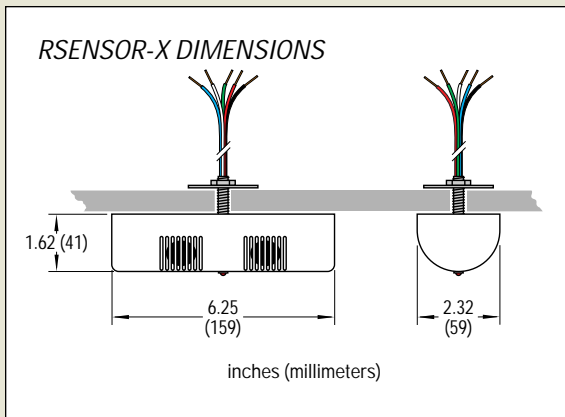
The RPSEN Series Photosensors below are used with the RPCON Controller, and are wired using 4 #20 AWG wires (Red/Black/White/Blue)

RPSEN-IN	Interior Photosensor	Typical application: 30-70 fc for perimeter offices Indoor use only, 0 to 50°C (32 to 120°F)
RPSEN-ATR	Atrium Photosensor	Typical application: 100-200 fc for atriums Indoor use only, 0 to 50°C (32 to 120°F)
RPSEN-SKY	Skylight Photosensor	Typical application: 1,000-2,000 fc for skylights Indoor use only, 0 to 50°C (32 to 120°F)
RPSEN-OUT	Outdoor Photosensor	Typical applications: 2-5 fc for parking lots 10-20 fc for canopies 30-50 fc for signage 300-500 fc for security lights Weatherproof, -30 to 50°C (-20 to 120°F)

# Occupancy Sensors

**O**CCUPANCY SENSORS ARE SIMPLY another type of switch — an *automatic* switch. For maximum flexibility, GE offers several types of occupancy sensors. Four low-voltage units (three ceiling-mount and one wall-mount switch) are designed to be compatible with GE TLC relay panels, and are described on the next three pages. There are three low-voltage “stand-alone” ceiling-mount sensors which operate with their own power/relay switchpack, and a line-voltage wall-mount switch which replaces a standard wall switch (See page 27).

Each ultrasonic sensor produces a low intensity, inaudible sound. The units detect changes in the sound waves caused by motion in the room, but do not respond to audible noises.



Catalog #	Description	Specifications
RSENSOR-1	One-Way Room Sensor	29 VAC±10%, 3 VA, Fused Four Teflon Pigtailed Time Delay: 30 seconds to 12 minutes Indoor use only
RSENSOR-2	Two-Way Room Sensor	Same as above with Five Teflon Pigtailed
RSENSOR-H	Hallway Sensor	Same as above with Five Teflon Pigtailed

## Low-Voltage TLC Ceiling-Mount Sensors

Low-voltage TLC-compatible ceiling-mount occupancy sensors draw power directly from the relay panel. They can simplify wiring and give the designer extra flexibility. This includes using a low-voltage switch to override the sensor, using one sensor to control a group of relays, and extending coverage through a master/slave configuration (see diagrams on opposite page).

Tying occupancy sensors together in a master/slave configuration allows any sensor in the group to turn ON a single circuit. As one example, this could be very useful in a long hallway where lighting is unscheduled, particularly if the hallway is not straight. Motion from an occupant entering any section of the corridor would be detected by the nearest sensor, immediately lighting up the entire hall. Separate circuits for each sensor are not necessary.

When the sensor detects motion, it pulses the relay ON by momentarily connecting red (ON) to white (COM). If no further motion is detected during the user-selected time delay, the sensor “times out” and pulses the relay OFF by connecting black (OFF) to white.

The LED comes on each time the unit senses motion, indicating the time delay has reset. However, it doesn't pulse the relay ON every time; only if the relay was previously pulsed OFF. Motion sensitivity and time delay are both adjustable.

Each sensor mounts through a single 3/4" hole in the ceiling tile. It should be positioned to have an unobstructed “view” of the space, but not face the



doorway where it may pick up outside motion. The line of sight must be through air. The sensor will not “see” through glass partitions or curtains. A mounting height of 10 feet or less is desirable. Do not mount where forced air will blow directly at the unit.

Three different ceiling-mount sensors cover the range of applications normally encountered in commercial spaces: one-way, for small rooms; two-way, for larger rooms; and hallway, for corridors and warehouse applications.

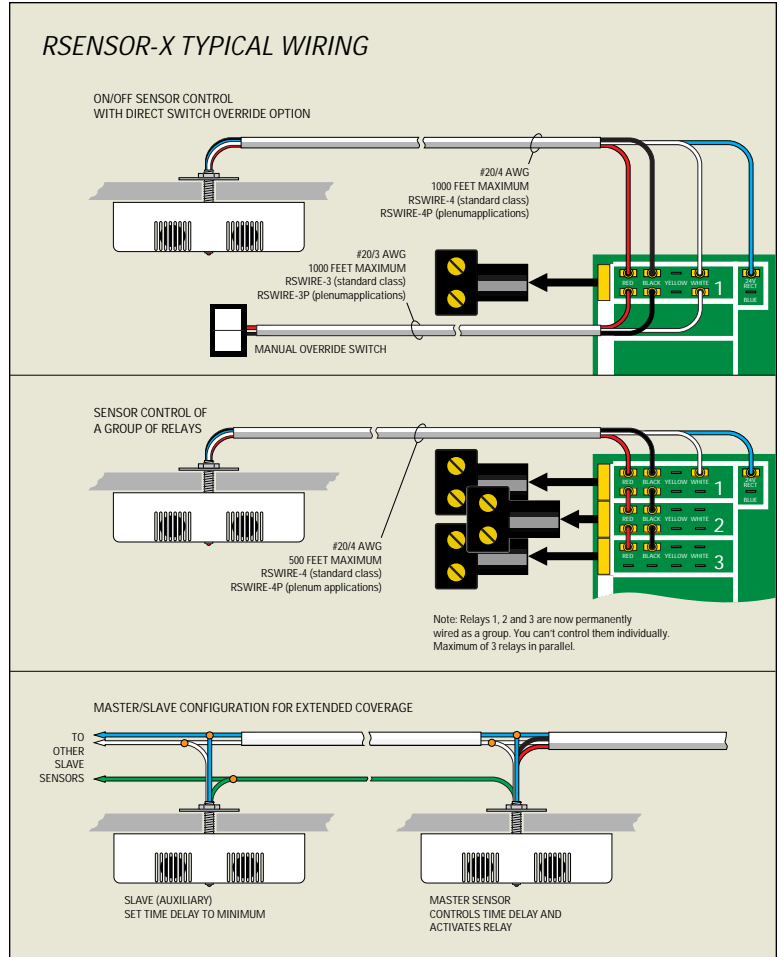
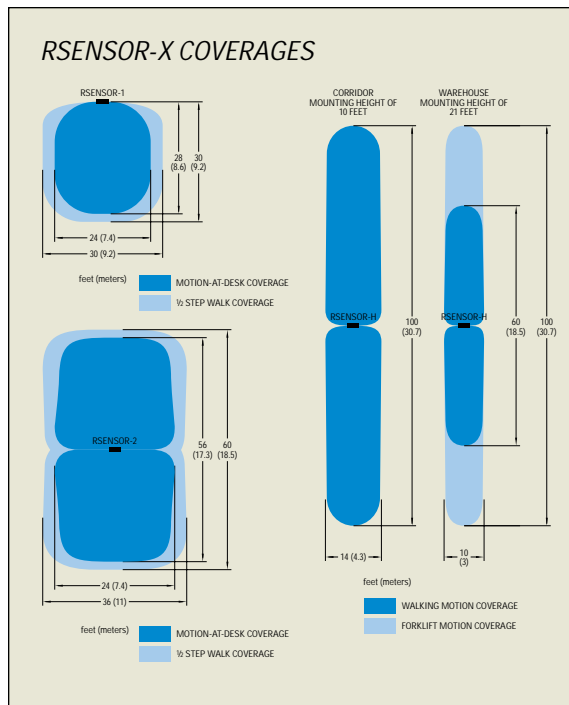
■ One-Way Room Sensor

The RSENSOR-1 one-way room sensor provides coverage of a typical enclosed office, conference room or small classroom up to 900 square feet.

■ Two-Way Room Sensor

The RSENSOR-2 two-way room sensor is designed to control larger rooms up to 2100 square feet. Multiple sensors may be wired in a master/slave configuration to provide coverage of even larger areas.

Large open spaces can be divided into individually controlled spaces by alternating frequencies on adjacent sensors. However, GE TLC recommends you consider alternative approaches to controlling large open spaces. Call 1-877-584-2685 for application assistance.



■ Hallway Sensor

The RSENSOR-H hallway sensor is designed specifically for use in corridors and warehouses where walking is the predominant motion to be detected. RSENSOR-H should not be used in classrooms or offices.

Mounted in a corridor at 10 feet from the floor, a single sensor provides coverage of 14 x 100 feet. Mounted in a warehouse at 21 feet, the coverage is reduced to 10 x 60 feet. Additional coverage may be obtained by wiring multiple sensors in a master/slave configuration as shown above.

# Occupancy Sensors continued

## Low-Voltage TLC Wall-Mount Sensor

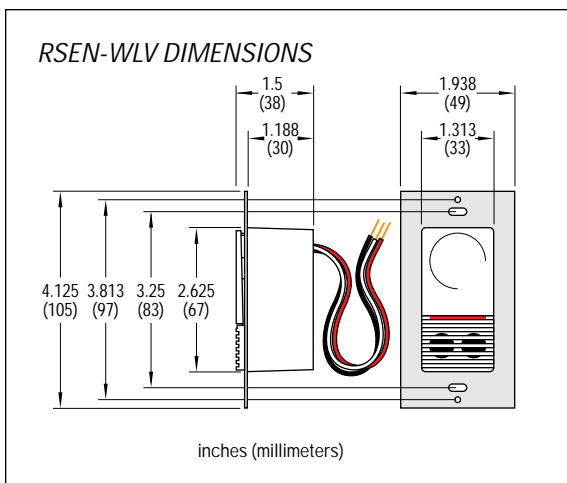
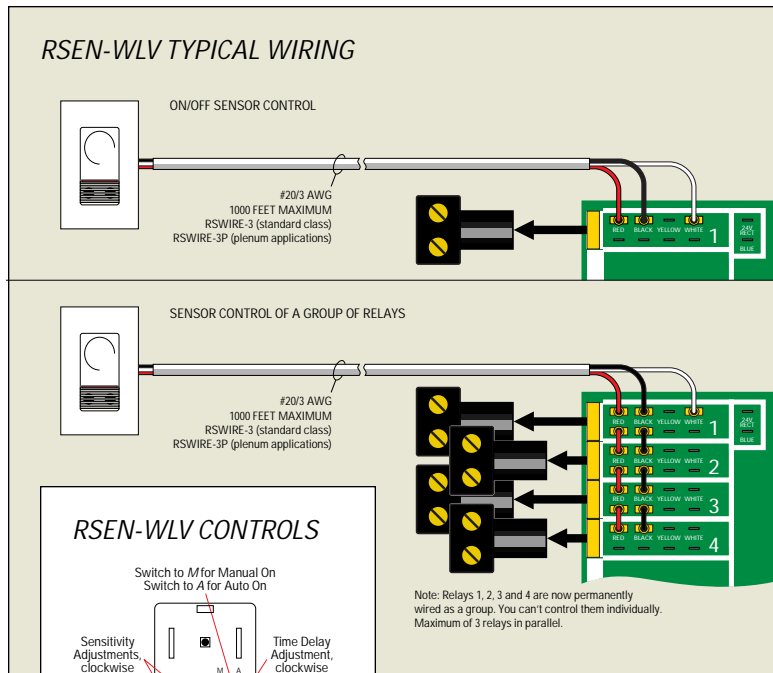
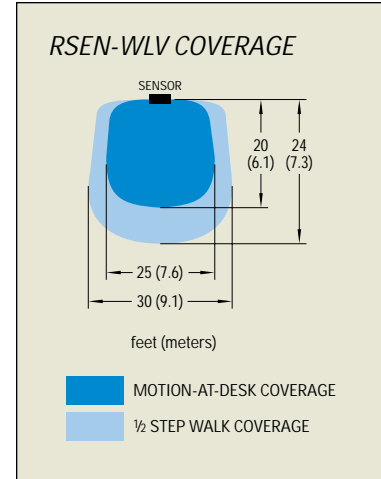
While the ceiling is the ideal place for mounting an occupancy sensor, some applications may require a wall-mount sensor.

The RSEN-WLV wall-mount occupancy sensor is a low-voltage TLC-compatible ultrasonic motion sensor which replaces conventional wall switches in rooms up to 400 square feet. This white sensor/switch fits into a designer-style wallplate (not included).

The sensor offers both Manual ON and Automatic ON modes, selectable by the user. In Manual ON mode, the occupant turns on lights when entering the room by pressing the switch. In Automatic ON mode, lights turn ON automatically when a person enters the room. In either mode, lights will remain ON as long as the room is occupied. After the room is vacated, lights turn OFF automatically after a user-selectable time delay. Lights may also be turned OFF by pressing the switch; even if the room is still occupied, lights will stay off.

Both time delay and motion sensitivity are user adjustable. The time delay may be adjusted from 15 seconds for testing to 15 minutes for operation. Normal time delay setting is 6 to 8 minutes. An adjustable entry sensitivity control avoids false activation from the corridor.

If the lights go OFF for lack of motion during the selected time delay period, a 10-second "grace" period begins which allows the lights to be turned ON again with motion, even in the Manual ON mode. After this 10-second period, the lights can be turned ON again by pressing the button.



Catalog #	Description	Specifications
RSEN-WLV	24 VAC, ON/OFF Ultrasonic Wall Switch Sensor	24-29 VAC±10% 1VA Max. for each sensor, 7VA Max. for each GE relay Time Delay: 15 seconds to 15 minutes Single-Gang Flush Mount UL Listed

### Stand-Alone Ceiling-Mount Sensors

For some applications, such as individual offices and conference rooms, occupancy sensors do not need to connect to the relay panel. Ceiling-mount sensors, with their own transformer-powered relay switchpacks, simply replace line-voltage switches to control individual spaces.

The low-voltage RSEN-xx series ceiling-mount sensors are identical in size and appearance to the TLC-compatible RSENSOR-x models. However, a switchpack containing a Class 2 transformer and a relay is required for sensor power and to switch the lighting circuit. Each switchpack can power up to five sensors.

Four RSEN-xx sensors are available to provide the coverage for a broad range of applications:

- **Small Room Sensors**

The small area RSEN-SM sensor provides coverage for a small office, classroom or other small space up to 500 square feet.

- **Medium Room Sensor**

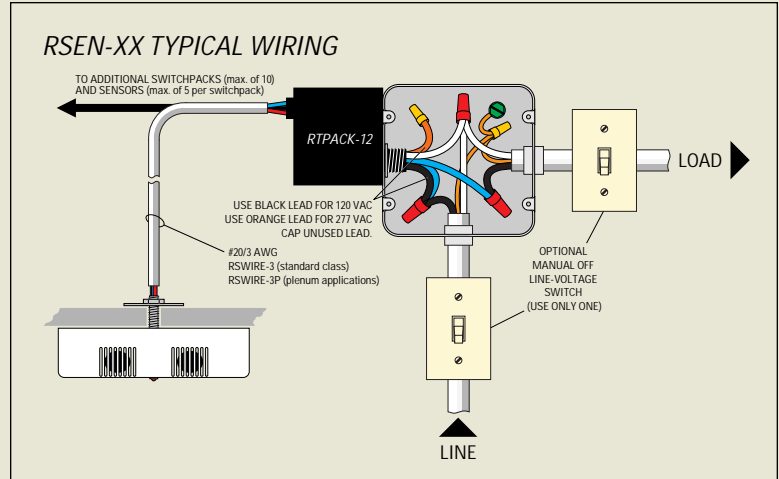
The medium room RSEN-MD sensor provides coverage up to 900 square feet. (See RSENSOR-1 coverage diagram on page 25.)

- **Large Room Sensor**

The large area RSEN-LG sensor, designed for large offices and classrooms, can cover up to 2100 square feet. (See RSENSOR-2 coverage diagram on page 25.)

- **Hallway Sensor**

The RSEN-2H sensor provides coverage in hallways and warehouses similar to the RSENSOR-H. (See coverage diagram and descriptions on page 25.)



Catalog #	Description	Specifications
RSEN-SM	One-Way Room Sensor for Small Areas	15 VDC from RTPACK-xx only* Time Delay: 15 seconds to 30 minutes Indoor Use Only
RSEN-MD	One-Way Room Sensor for Medium Areas	Same as above
RSEN-LG	Two-Way Room Sensor for Large Areas	Same as above
RSEN-2H	Two-Way Hallway Sensor	Same as above
RTPACK	120/277 VAC Switchpack	Input: 120 or 277 VAC $\pm 10\%$ 60 Hz Output: 15 VDC 200 mA to operate up to 5 sensors UL Listed, CSA Certified
RTPACK-347	347 VAC Switchpack	Input: 347 VAC $\pm 10\%$ 60 Hz Output: 15 VDC 200 mA to operate up to 5 sensors CSA Certified Available in Canada only

\* Sensors and Switchpacks are interconnected using #18 AWG Class 2 wiring per NEC 725.

### Line-Voltage Wall-Mount Sensors

The RSEN-WX series line-voltage wall-mount occupancy sensors are designed to replace standard wall switches, and are wired the same as conventional line-voltage wall switches. They are available in white and fit a standard designer style wallplate, which is not included.

The RSEN-WX series sensors are identical to the RSEN-WLV in appearance and dimensions. Control functions are also similar, with an extended time delay, from 15 seconds to 30 minutes

Catalog #	Description	Specifications
RSEN-W12	120/277 VAC, ON/OFF Ultrasonic Wall Switch Sensor	Two-Wire 120 VAC: Maximum Load: 6.7A (approx. 800W) Minimum Load: One Ballast or Incandescent Lamp Tungsten or Ballast Load 277 VAC: Maximum Load: 4.3A (approx. 1200W) Minimum Load: One Ballast Ballast Load Only Time Delay: 15 seconds to 30 minutes Single-Gang Flush Mount UL Listed, CSA Certified
RSEN-W3	347 VAC, ON/OFF Ultrasonic Wall Switch Sensor	Two-Wire Maximum Load: 1.7A (approx. 600W) Minimum Load: 0.2A (approx. 70W) Ballast Load Only Time Delay: 15 seconds to 30 minutes Single-Gang Flush Mount CSA Certified Available in Canada only

## Low-Voltage Control Wire

**L**OW VOLTAGE CONTROL WIRING must conform to Class 2 or Class 2P requirements as defined in the National Electric Code. This is a minimum requirement. It does not guarantee a quality installation. The key to simple, trouble-free installation is a well-documented system that conforms to best wiring practices, including consistent color coding and numbering. Each relay in a TLC panel is numbered and a directory provided to cross-reference the relay to the load controlled. In addition, all terminations are color-coded for simple assembly and

review. TLC low voltage wires conform to GE color code and all TLC typical wiring and support diagrams use this color coding practice.

Note to the designer: The biggest problem occurs with cabling for groups of switches or remote relays. For a single switch, the industry standard of Red/Black/White matches the TLC wiring. For pilot light switches, remote relays, occupancy sensors, photosensors and multiple switch locations, industry color coding is inconsistent and confusing. Use GE cabling to minimize the confusion.

<i>Catalog #</i>	<i>Max. Diameter inch (mm)</i>	<i>Description</i>
<i>Standard Low-Voltage Switch Wire</i>		
RSWIRE-3	.210 (5.33)	3-conductor, stranded, #20 AWG, Red/Black/White with jacket. Not for use in risers or air-handling plenums.
RSWIRE-3P	.150 (3.81)	Same as above except rated for use in risers and air-handling plenums.
<i>Pilot/Locator Light Low-Voltage Switch Wire</i>		
RSWIRE-4	.230 (5.84)	4-conductor, stranded, #20 AWG, Red/Black/Yellow/White with jacket. Not for use in risers or air-handling plenums.
RSWIRE-4P	.175 (4.45)	Same as above except rated for use in risers and air-handling plenums.
<i>Standard or Pilot Light 8-Gang Master Switch Wire</i>		
RSWIRE-25	.540 (13.72)	Eight individually identified sets of 3 #20 AWG stranded conductors. Each set contains a Red/Black/Yellow conductor. Single No. 18 AWG White Common. Not for use in risers or air-handling plenums.
RSWIRE-25P	.435 (11.05)	Same as above except rated for use in risers and air-handling plenums.
<i>Sensor Wire</i>		
ROSWIRE-4	.230 (5.84)	4-conductor, stranded, #20 AWG, Red/Black/Blue/White with jacket. For use with occupancy sensors, photosensors and locator switches. Not for use in risers or air-handling plenums.
ROSWIRE-4P	.210 (5.33)	Same as above except rated for use in risers and air-handling plenums.
<i>Relay Wire (For Remote Mounted RR7P or RR9P Relays)</i>		
RRWIRE-5	.255 (6.48)	5-conductor, stranded, #20 AWG, Red/Black/Yellow/Blue/White with jacket. Not for use in risers or air-handling plenums.
RRWIRE-5P	.200 (5.08)	Same as above except rated for use in risers and air-handling plenums.
RRWIRE-22	.540 (13.72)	22-conductor, jacketed cable for remote group of 6 relays. Six individually identified sets of 3 #20 AWG, stranded conductors. Each set contains a Red/Black/Yellow conductor. Set also contains White Common (2), Blue and Yellow. Not for use in risers or air-handling plenums.
RRWIRE-22P	.520 (13.21)	Same as above except rated for use in risers and air-handling plenums.
<i>Panel Wire (Individual #18 AWG, stranded copper wires with the following color codes are recommended. Purchase from your regular wire supplier.)</i>		
<i>Color</i>		<i>Description</i>
Black		OFF leads from control units* to relays or jumpers.
Red		ON leads from control units* to relays or jumpers.
Blue		Rectified power to relays, occupancy sensors and pilot lights.
Blue/White		Unrectified power to control units* to relays or jumpers.
White		Common

\*RMS, RPCON, RPCON3-OUT, RSP12, RCS12

# Replacement Parts

Replacement parts in this section are available from GE TLC Service. Call 1-877-584-2685.

<i>Catalog #</i>	<i>Description</i>
<i>12-Position Master Switch</i>	
RMS4A	12-Position Master Selector Switch
RA 12	Pilot Light Assembly for RMS4A
<i>RCS Series Switches and Plates</i>	
RCS 2PL	Switch – Pilot, Ivory
RCS 9PL	Switch – Pilot, Gray
RP311	Plate – 1 Gang, 1 Switch (302 Stainless, Horizontal Mount)
RP312	Plate – 1 Gang, 2 Switch (302 Stainless, Horizontal Mount)
RP313	Plate – 1 Gang, 3 Switch (302 Stainless, Horizontal Mount)
RP324	Plate – 2 Gang, 4 Switch (302 Stainless, Horizontal Mount)

Parts below are available through distribution, but will be discontinued when remaining stocks are depleted.

<i>Catalog #</i>	<i>Description</i>
<i>RFS/RKS Series Switches and Plates</i>	
RFS6	Switch – Unlighted, Ivory
RKS6	Switch – Unlighted, Key-Operated, Ivory
RK0	Key for RKS6 Switch
RP211	Plate – 1 Gang, 1 Switch (302 Stainless, Horizontal Mount)
RP212	Plate – 1 Gang, 2 Switch (302 Stainless, Horizontal Mount)
RP213	Plate – 1 Gang, 3 Switch (302 Stainless, Horizontal Mount)
RP224	Plate – 2 Gang, 4 Switch (302 Stainless, Horizontal Mount)
RP1	Plate – 1 Gang, 1 Switch (Ivory Urea, Horizontal Mount)
RP2	Plate – 1 Gang, 2 Switch (Ivory Urea, Horizontal Mount)
RP3	Plate – 1 Gang, 3 Switch (Ivory Urea, Horizontal Mount)
RP24	Plate – 2 Gang, 4 Switch (Ivory Urea, Horizontal Mount)
RA13	Surface Mounting Frame – Base and Cover, Ivory

## Discontinued Products

<i>Catalog #</i>	<i>Description</i>	<i>Replacement</i>
<i>Relays (20 amp)</i>		
RR3	Standard Relay	RR7
RR4	Standard Relay with Pilot	RR8 or RR9
RR5	Plug-In Relay	RR7
RR6	Plug-In Relay with Pilot	RR8 or RR9 (requires rewiring)*
<i>Controls</i>		
RMS5BL	Motor Master (OFF outputs)	RMS8/16/32
RMS5RL	Motor Master (ON outputs)	RMS8/16/32
RSI2	Switch Interface	RCS12 or RMS8/16/32
RCBD1	Blocking Diode Assembly	RMS8/16/32
RA20	Single Replacement Diode for RCBD1	N/A

\*For wiring diagram, contact GE TLC Applications Support at 1-877-584-2685.

# Guideform Specification

## Remote Control Wiring System

Furnish and install complete remote control wiring system for control of lighting and other equipment as indicated on drawings and schedules. System shall be complete with modular relay panels including enclosures, transformers, relays, and lighting automation controllers, as well as switches, pilot lights, wallplates, sensors, and wiring. Remote control equipment shall be as manufactured by GE Total Lighting Control or of equal quality as approved by the design engineer.

### ■ Modular Relay Panels

All pre-assembled panels shall be UL Listed (CSA Certified in Canada) and consist of an enclosure with cover, interior, relays, and power supply, as follows:

#### Enclosure

NEMA 1 enclosure capable of mounting 12, 24 or 48-relay interior. Surface or flush cover with captive screws in a hinged, lockable configuration.

#### Interior

Separate interior for installation after early rough-in wiring is complete. Interior consisting of a bracket and circuit board backplane with connectors for plug-in relays, and a barrier separating low voltage (24 VAC) from line voltage wiring sections.

#### Relays

Mechanically-held, momentary pulsed contactors rated at 20 amps, 120/277 VAC (347 VAC in Canada). Electrically-held relays are not acceptable. Relays attaching to the interior by a single plug-in connector and capable of replacement on an individual basis. Each relay capable of direct ON/OFF control by a low voltage switch and/or occupancy sensor.

#### Power Supply

Two separate 40 VA transformers in one power supply assembly, connecting to the circuit board by a 5-pin connector. One transformer to power the relays and associated low voltage switches and sensors, the second to power accessory devices. Systems requiring a separate pilot light transformer circuit will not be acceptable. Transformers include internal overcurrent protection with automatic reset and metal oxide varistor protection against powerline spikes.

### ■ Switches

Specification grade momentary contact, 3-wire, push button switches in standard, pilot and locator light options. Matched switches and nylon plates in white, ivory or gray, with optional stainless plates. Plate includes bracket for the following configurations: 1-gang plate for 1 or 2 switches, 2-gang plate for 3 or 4 switches. Option: heavy-duty toggle-type momentary switches for standard plates.

### ■ Automation

#### Master ON/OFF Sequencer

Provide master ON/OFF control of relay group while still allowing individual relays to be overridden by their local switches. Two independent switch input channels, accepting either 2-wire maintained or 3-wire maintained or momentary dry contact. Sequencer modules with 8, 16 or 32 relay outputs, each output capable of controlling up to 3 relays wired in parallel.

#### Switch Interface and Smart Sweeper

Provide master ON/OFF similar to sequencer.

Accept any 2- or 3-wire switch. One master input to control all

connected relays ON/OFF, 12 individual switch inputs corresponding to 12 relay outputs, each output capable of controlling up to 3 relays wired in parallel.

Additional functions of Smart Sweeper – Occupied/Unoccupied dry contact for interface to schedule control. Options for Manual ON/Auto ON, user-adjustable time delay for overrides and blink warn before OFF.

#### Outdoor Lighting Control

Works in combination with a single weatherproof photosensor to be powered via low voltage wiring from the panel. Control unit provides Occupied/Unoccupied dry contact for interface to schedule control, plus 3 separate intelligent outputs for ON/OFF control of Security, Parking, and Signage lighting. Each output:

- has corresponding user-selectable footcandle set point, with an additional selectable egress delay for Parking.
- is capable of driving up to 3 relays wired in parallel, or 1 smart input to another control unit.
- is controlled using smart scenarios designed specifically for the three types of lighting.

#### Daylighting Controls

Works with any of 4 possible sensor devices, with the ability to select 1 of 4 separate footcandle ranges (1-10 fc, 10-100 fc, 100-1000 fc, 1000-10000 fc). Direct control of up to 3 separate devices, including a relay or other device which allows control by a 3-wire momentary contact. Separate trip points for high and low response, entered via easily readable dial switches, with 3-minute time delay to avoid nuisance tripping. Unit to allow momentary contact to override all photocell-controlled relays ON/OFF.

*Photosensors* – Powered via low voltage wiring from the panel (no auxiliary power supply). Sensors provided as needed for lighting control applications including indoor perimeter spaces, atriums, skylights, and exterior lighting.

#### Occupancy Sensors

*Low-Voltage TLC-Compatible* – Sensors directly compatible with the modular relay panels, wired directly to panels without any auxiliary components or devices required above the ceiling. Sensors designed specifically for the size and use of the area in which they will be installed. Separate sensitivity and time delay adjustments (from 30 seconds to 12 minutes) readily accessible to the user.

Ceiling sensors for general purpose rooms and hallways available in one-way or two-way configurations. Multiple two-way sensors may be wired in a master/slave format for extended coverage.

Single-gang wall sensor mounts flush in a standard designer wall plate. User-selectable time delay (15 sec to 15 min), sensitivity, and Manual ON/Auto ON modes.

*Low-Voltage Stand-Alone* – Ceiling sensors powered through 120/277 VAC or 347 VAC switchpack. Switchpack shall be UL Listed (CSA Certified in Canada).

*Line-Voltage* – 120/277 VAC and 347 VAC wall sensors same functionality as above. Wall sensor shall be UL Listed (CSA Certified in Canada).

### ■ Wiring

Low voltage wiring from the switches and sensors to the relay panel shall be Class 2 or Class 2P as required by the National Electrical Code and local standards. Wiring color coded to match the relays, switches and sensors as follows:

Red = ON	Blue = 24 VAC Rectified	White = Common
Black = OFF	Yellow = Pilot	

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