# WPC-5621K Daylight Sensor Switch

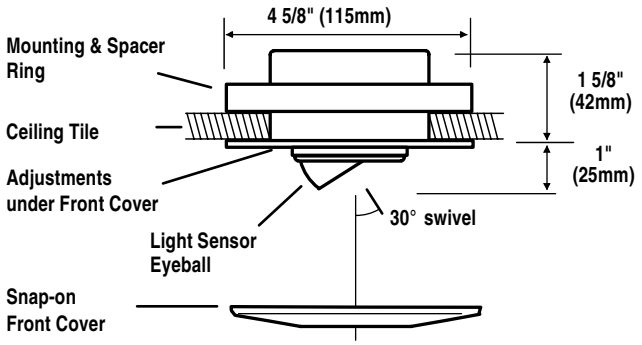
## Applications & Circuits

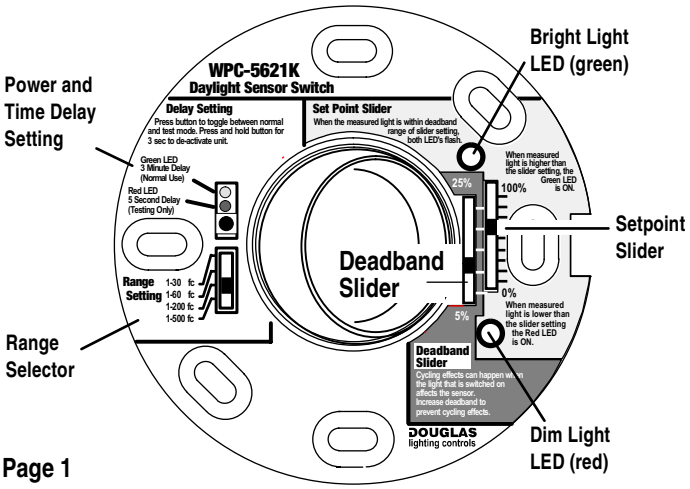
***CONTENTS***



DOUGLAS
lighting controls

## *PARTS & DIMENSIONS*






## *SPECIFICATIONS*

### *WPC-5621K Daylight Sensor Switch*

***Power***

- Power requirement: 24VAC 30mA
  Class 2 Low Voltage device.
- Power rating does not include power used to switch relays.

***Enable/Disable***

- The sensor has an Enable/Disable terminal which starts and stops the switching action of the sensor. The sensor will only work if this terminal has 24VAC supplied to it.

***Outputs***

- ONE output compatible to all models of Douglas 2-wire relay. Connect a maximum of 4 relays (#18AWG @ 500').
- Auxiliary contact outputs (contact ratings: 1A / 30V).
  Two form A contacts: one for ON signal, one for OFF signal.

***Photocell Adjustments***

- Sensing element is photo diode type that is color corrected to match the Photopic curve.
- Ranges: 30, 60, 200 and 500 footcandles.
- There is a Setpoint adjustment and a Deadband adjustment on the WPC-5621K sensor.
- Time delay of switching response is selectable between 5 sec for testing and 3 min for normal use.

***Environment***

- Indoors, stationary, non-vibrating, non-corrosive atmosphere and non-condensing humidity.
- Ambient operating temperature:
  -15$^{O}$F to +140$^{O}$F (-25$^{O}$C to +60$^{O}$C)

## *ADJUSTMENTS*

***ON/OFF & Time Delay Button***

Press button to toggle between the 3 minute delay (regular mode) and the 5 second delay (test mode). Unit will automatically revert to the 3m mode after 60 minutes. The 3 min setting prevents false tripping which may occur should a person or cloud temporarily affect the light reaching the sensor. The time delay button can also turn the sensor off, press and hold the button for 3 seconds. When you switch the sensor OFF, the sensor will issue an OFF signal first.

***Set Point Slider & Range Switch***

The light measured by the sensor is typically ¼ to ¾ of that incident on the floor or work surface. For office or traffic areas, a good light level is 60 footcandles (approx 30 fc at the detector).

Initial set up: Set range setting to the 1-60 footcandle range if floor is darkly colored or the 1-200 footcandle range if floor is lightly colored.

Set setpoint slider to 50%, Deadband slider to 5%.

For factory areas requiring brighter light, use higher adjustments. Experimentation is required to obtain best results.

***Deadband Slider***

Initially set slider to 5%; usually this is sufficient. However, the light that is switched ON may affect the sensor reading enough for the sensor to switch the light back OFF and later back ON due to lack of light. This is called "cycling". To prevent cycling, increase the deadband.

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## *QUICK CONNECTION GUIDE*

The WPC-5621K sensor can be used for a variety of switching circuits. If all possible circuit configurations are to be made available, connect seven wires from the sensor to the host relay panel. If a wall switch is being used to enable/disable the sensor, an additional two wires are needed from the switch to the sensor or relay panel.



## *TESTING*

***1) Test that the Sensor has Power and is Enabled***

- Remove the cover plate from the front of the WPC-5621K. Ensure the "time delay" switch is on the 5 sec or 3 min position. One of the LEDs is ON or both LEDs are flashing.
- If the LEDs are OFF, then the sensor is most likely not enabled. In addition to the 24V power, the sensor requires a 24V enable signal to function. (See OPERATING SEQUENCE for further details). Ensure that the enable signal is on and that the sensor has 24V power. If the LEDs are still OFF, the sensor is defective.

***2) Test that the Sensor Switches the Lights ON and OFF***

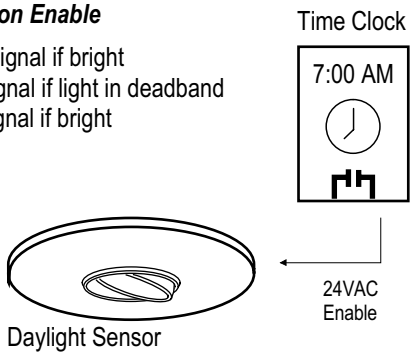
- Set the "Time Delay" switch to the "Power OFF position". If lights are ON, they should turn OFF.
- Set the time delay switch back to the 5 sec position and cover the sensor with your hand. The lights should switch ON. Remove your hand and observe if the bright led comes ON. If not, adjust the setpoint so that the bright LED comes ON. When it does, the lights should switch OFF after 5 seconds.
- It is possible to wire the sensor so that Only ON or Only OFF signals result. If the sensor is only switching ON or OFF, check the circuiting of the sensor. (See CONNECTIONS: Enable/Disable Circuiting for further details).

***3) Troubleshooting***

- If the sensor appears to be functioning (Sensor's LEDs are ON), double check that the circuit powering the lamp works.
- The sensor does not control the lamp's circuit directly. It switches a relay or signals some other system that actually switches the lamp's circuit ON and OFF. Check that the sensor signaling circuit is correctly connected. Try to actuate this signal circuit with a relay switch or contact closure (depending upon the circuit). If the circuit works, the sensor is then likely defective.

***Switching upon Enable***

a) OFF signal if bright
b) NO signal if light in deadband
c) ON signal if bright

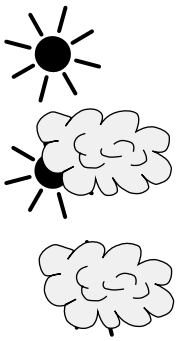



***Switching by changed Light Levels***

Lots of natural light:
Lights OFF

Partly cloudy:
Light level indeterminate,
Lights maybe ON or OFF

Cloudy and Dark:
Switch Lights ON





## *SEQUENCE OF OPERATION*

The description below is a typical sequence of operation that utilizes the features and controls of the WPC-5621K.

Please refer to page 9b for a graphic time line showing the sensor's switching sequence.

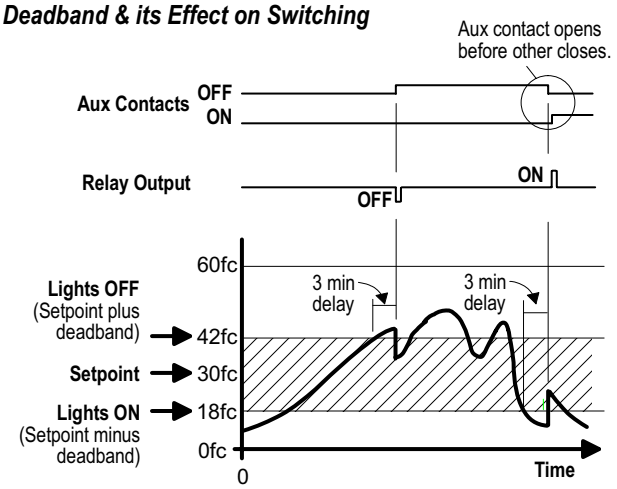
***Enabling Sensor***

1) It is night time and the building space is unoccupied. All lights are OFF and the daylight sensor is disabled.
2) At 7:00 AM a time clock enables the sensor by applying 24VAC to the enable/disable terminal of the sensor.
3) When the sensor is enabled, it will measure the light level present and respond within 1 second (regardless of time delay setting) as follows:
   a) If the light level is above the set point (bright LED is ON), the sensor will signal the relay output OFF and the Aux OFF contact closes.
   b) If the light level is at the setpoint within the deadband value (both LEDs are flashing) the sensor will make no relay signal and the Aux contacts stay open.
   c) If the light level is below the set point (dim LED is ON), the sensor will signal the relay output ON and the Aux ON contact closes.

***Normal Operation***

4) Throughout the day, the light sensor measures the light level and switches lights OFF and ON in step with the amount of natural light present. When the room becomes brighter from natural light, the sensor signals OFF and should the day become cloudy and dark, the sensor signals ON to switch lights ON.
5) NOTE: Take care when observing the sensor. When your hand and/or body are close to the sensor, the reading will be affected. The LED indicators always show the present light measurement.

***Deadband & its Effect on Switching***




***Deadband Controls***

6) When natural light decreases, the sensor's measurement will cross through the setpoint and, after the delay, switch the lights ON. The lights will increase the illumination present in the room and the sensor will then measure the brighter light level and switch the lights back OFF. The room is now dim and the sensor measures the dim room and switches the lights back ON, and so forth. This phenomenon is called cycling.
7) To prevent cycling, the sensor has a deadband setting. The deadband can be set from 5% to 25% of the setpoint's total range. Increasing the deadband makes the setpoint wider. The setpoint's upper value is where an OFF signal occurs and the lower value is where the ON signal occurs.

   Example 1) 60 footcandle range, 5% deadband
   Deadband is ±3 footcandles of the setpoint slider's setting.

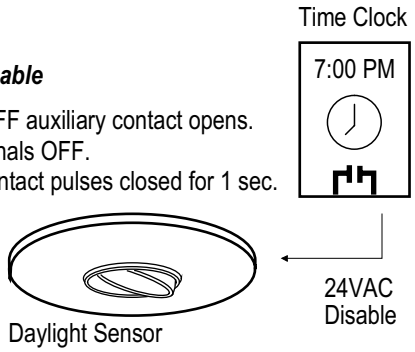
   Example 2) 60 footcandle range, 25% deadband
   Deadband is ±15 footcandles of the setpoint slider's setting.

***Disabling Sensor***

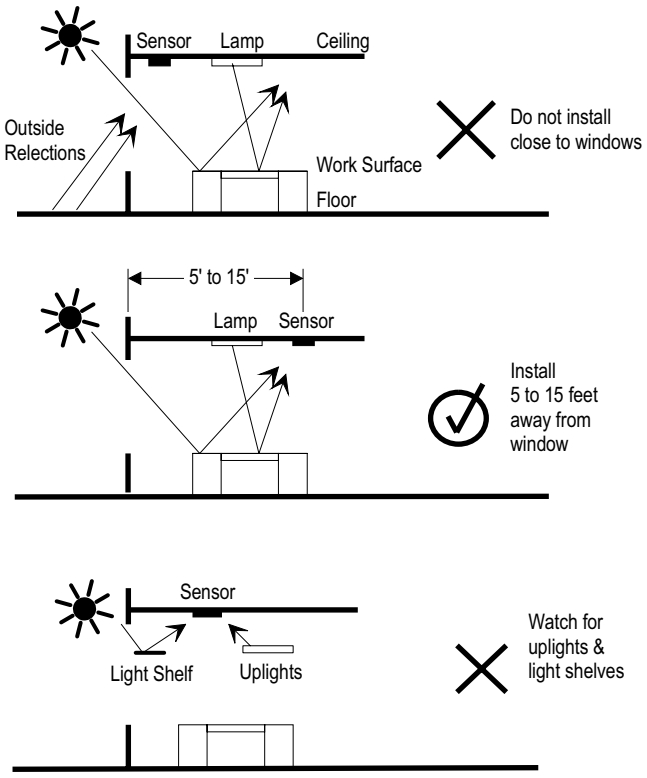
8) The building gradually becomes unoccupied as the day draws to a close. The lights may or may not be ON depending upon the natural light level. At 7:00 PM the building is unoccupied.
9) The same time clock that enabled the sensor at 7:00 AM now disables the sensor.
10) When the sensor is disabled, it opens whichever auxiliary contact is closed, waits one second and then switches the relay output OFF and pulses the OFF aux contact once. The sensor then shuts itself OFF.
11) When disabled, the sensor will not switch lights. In the morning when the lights are again needed, the sensor is enabled and the operation begins again.

***Switching upon Disable***

Closed ON or OFF auxiliary contact opens.
Relay output signals OFF.
OFF auxiliary contact pulses closed for 1 sec.



## *LOCATION OF DAYLIGHT SENSOR*




***Mount so that Sensor's Adjustments are accessible***

1) The sensor's adjustments are located under the front, snap-on cover. Mount sensor only in locations that can be reached with a step ladder. Mounting sensor at high locations will greatly impede the sensor from being properly adjusted.
2) If the application requires the sensor to be mounted in an inaccessable location, use the WPC-5577 remote sensor with a controller instead of the WPC-5621K.

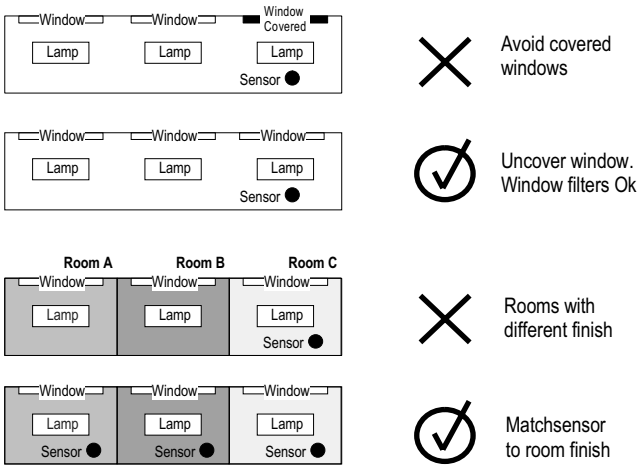
***Mount Away From Windows***

1) The WPC-5621K is intended for rooms with windows on one or two sides. Window measurements are not representative of light that is inside the room. The ceiling by the window can have less light than what is actually in the room. The ceiling by the window can also capture reflections from outside. Do not install the sensor right at the window.
2) Locate the WPC-5621K at least 5 to 15 feet away from the window and, if possible, at least 5 feet away from interior walls. This will locate the sensor to a spot that measures the actual amount of light (natural and artificial) at an indoor location.
3) The sensor lens can be tilted to help better aim the sensor to obtain the light from the correct surface.

***Mount Away from Uplights and Light Shelves***

1) Watch that the sensor is not receiving light from direct sources such as light shelves and uplights.
2) If there are light shelves or uplights, locate sensor under up light or at a location on the ceiling that has little illumination from the light shelf or uplight.





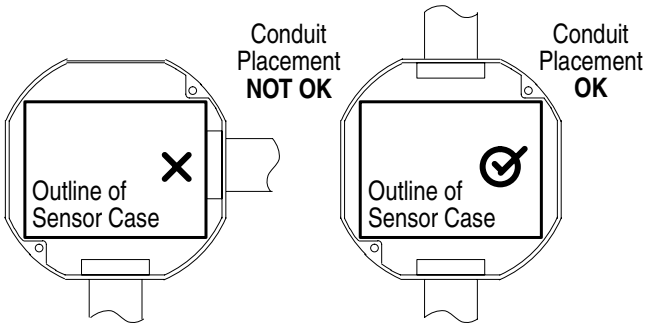

***Sharing a Sensor over Several Rooms***

1) A sensor can be located so that a large area of lighting is controlled. This works best for locations that have a common finish and common orientation to the natural light.
2) A common application is for corridors and walkways that have windows along one side. Another application can be for insititutional open spaces such as cafeterias, lobby areas and some open office plans.
3) For individual office spaces, daylight sensor operation may have limited success. First, it is usually not possible to share a sensor for several rooms due to different finishes. Second, it is disconcerting for the occupant when the lights abruptly switch.
4) A solution is to install a sensor in each room. This can be a costly approach. Another, possibly better, alternative would be to use a dimmable ballast and the less costly regulating daylight sensor WPC-5700 and an ON/OFF switch (relay or line voltage type) to switch the ballast.

## ***MOUNTING*** **-** ***Octagon Box***

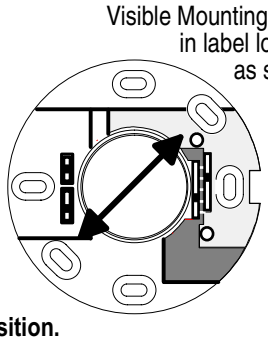
***Conduit Placement***

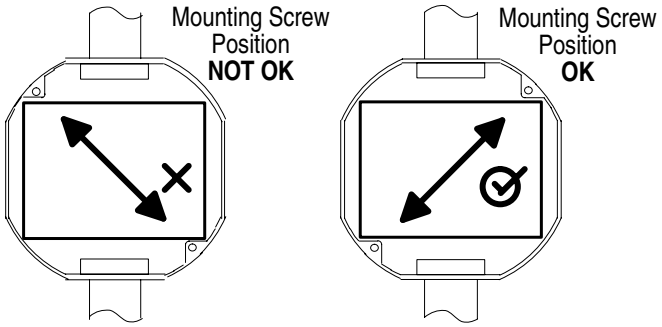
The WPC-5621K Daylight Sensor has a low, attractive profile when mounted on a ceiling. To accomplish this, all of the electronics and the lens mechanism of the detector fills the inside of an octagon box. Conduit **must** be attached at opposite ends of the box. Conduit attached at right angles to box will interfere with the detector case. **Take care with positioning conduit to octagon box.**




***Mounting Hole Position***

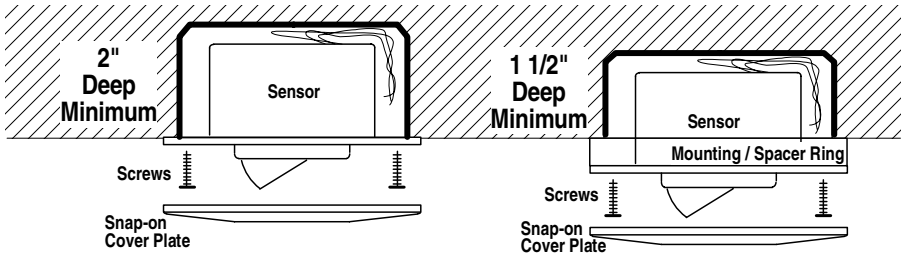
The WPC-5621K Daylight Sensor is well-labeled to help users easily understand how to adjust the sensor. The label covers 1 of the 2 pairs of mounting holes available for octagon box installations. The label is made of vinyl and can be peeled back to gain access to the hidden pair of mounting holes if needed. However, try to avoid this inconvenience and possibly damaging the label. **Take care to position conduit with respect to the mounting screw's position.**




***Octagon Box Depth***

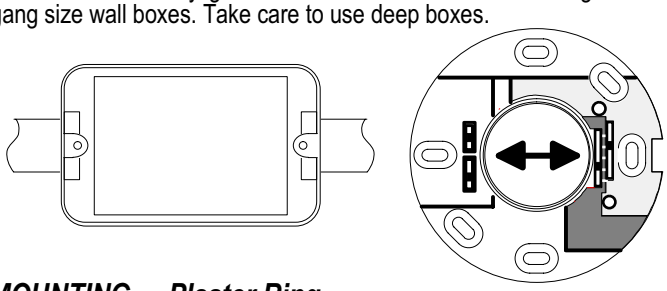
Use a deep octagon box (2" minimum). This will allow more space for wires. If the box is not deep enough, the Mounting/Spacer Ring will help to provide more space at the expense of the low profile appearance.






## ***MOUNTING*** **-** ***Single Gang Size Wall Box***

The WPC-5621K Daylight Sensor can also be mounted to single gang size wall boxes. Take care to use deep boxes.

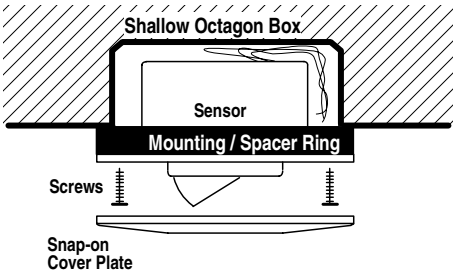


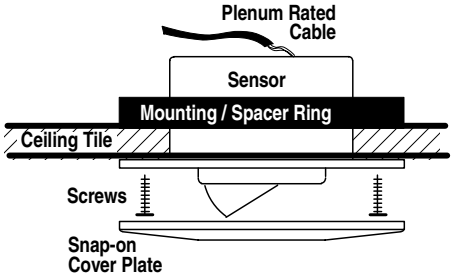
## ***MOUNTING*** **-** ***Plaster Ring***

You must check to ensure that the opening of the plaster ring is large enough for the WPC-5621K. Many plaster rings have rounded corners which obstruct the detector from fitting through the ring's

## ***MOUNTING*** **-** ***Mounting Spacer Ring***

The Mounting/Spacer Ring has 2 uses. It can be used as a spacer to allow the WPC-5621K to fit into shallow boxes or it can be used to mount the detector onto ceiling tile. Check local fire regulations regarding ceiling tile installations. Most likely, plenum rated cable is necessary.



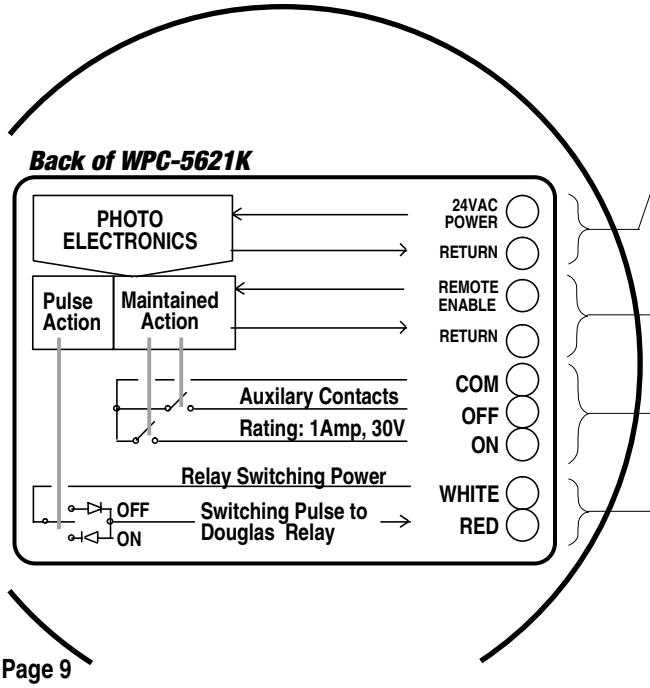




- Cut a 3" x 2-1/4" hole into tile.
- Secure with Mounting / Spacer Ring.

## *CONNECTIONS*

### *General Information*

- The WPC-5621K Daylight Sensor has several inputs and outputs.
- Your application may use some or all of the inputs and outputs. The following pages show various schematics that should provide solutions for most applications.




***Power***

The WPC-5621K Sensor requires 24VAC for power. The unit uses 36mA of current to operate. Power used to switch relays is additional.

***Enable/Disable Input***

Applying 24 VAC to this terminal enables the unit to function. Removing the 24V disables the sensor.

The sensor must be enabled to operate. Use a time clock to enable and disable the sensor to function during hours of occupancy. If the sensor is to operate for 24 hours, jumper the 24VAC power to the enable terminals.

Upon enable the sensor takes a reading and switches the lights ON, OFF, or does nothing if the current light level is within the deadband area.

***Auxiliary Contact Outputs***

The auxiliary contacts are rated at 30Volts - 1Amp.

There are 2 form A contacts supplied. When the sensor is enabled and the light level is in the deadband zone, both contacts will remain open. If lights are to be switched ON (dim light measure) the ON contact will close. For lights OFF (bright light measure) the OFF contact closes.

When the sensor is disabled, the closed contact will open and the OFF contact will pulse once for 1 second.

***Douglas Relay Output***

The WPC-5621K Sensor has a Douglas relay output compatible with all models of Douglas 20 Amp, 120/277/347 VAC latching 2-wire relays.

The relay output switches in step with the Auxiliary contacts.

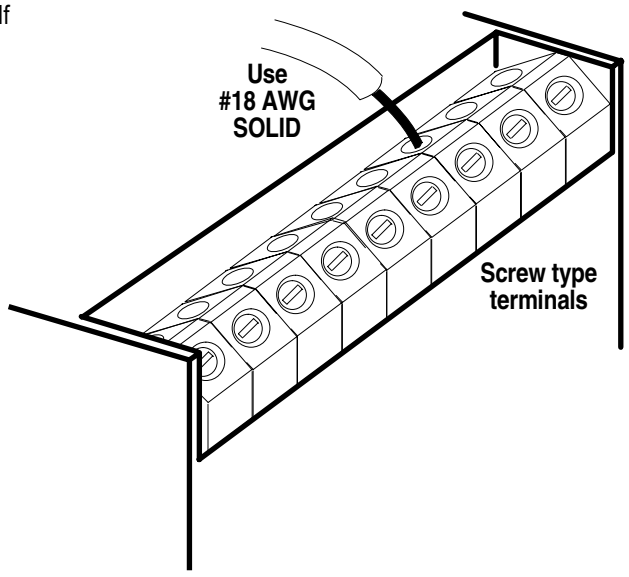


## *CONNECTIONS*

### *Wire Size and Type: IMPORTANT*

- **Do not use heavier gauges than #18 AWG**

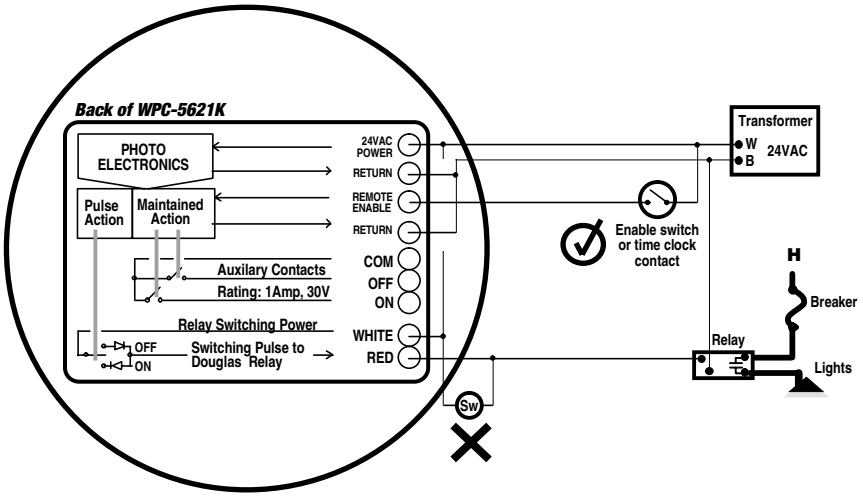
  Wires heavier than #18 will damage the connector and will prevent the detector from fitting properly into a backbox.
- Solid conductors are recommended over stranded conductors. If using stranded conductors, take care not to have any loose strands that can short to the adjacent terminal.



## *CONNECTIONS*

### *Enable/Disable*

The Enable/Disable terminal is used to enable the sensor's function. Control of the Enable/Disable terminal is usually required for most installations. The sensor is only required to switch the lights during occupied times. Otherwise it should not switch lights.



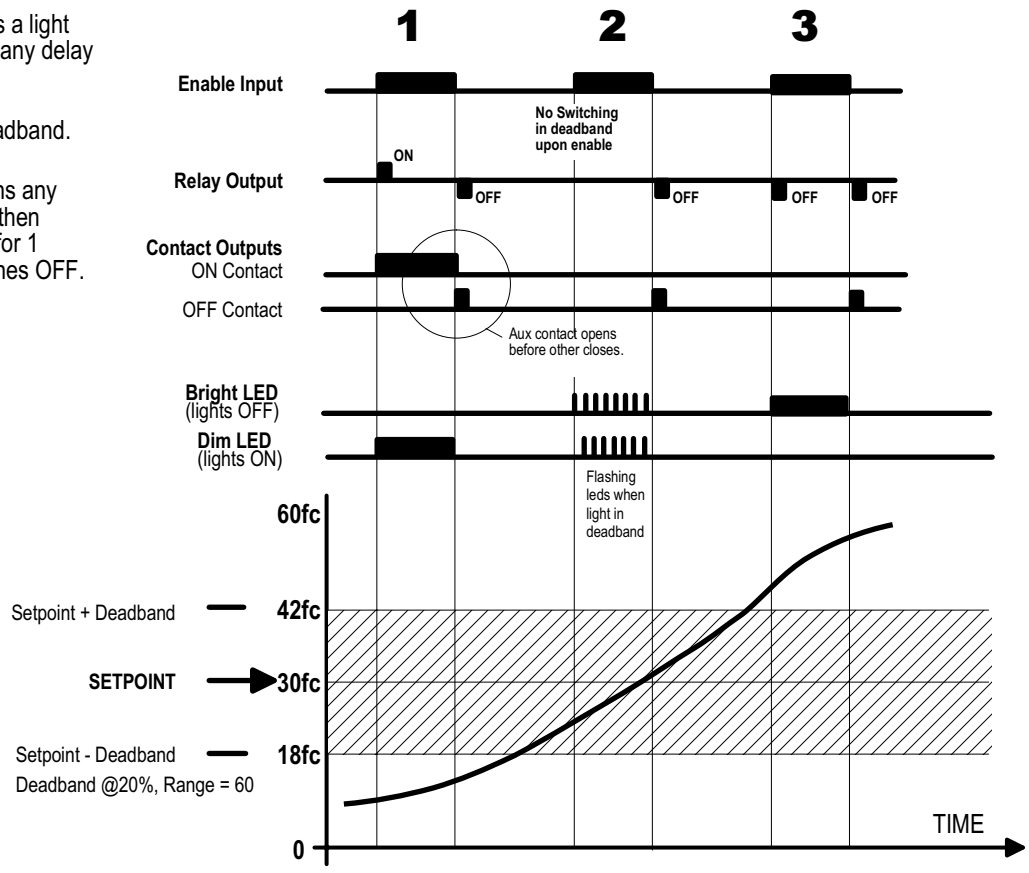

### *Relay Switch*

Connecting a switch directly to the relay will tend to defeat the sensor's effectiveness (user override). Control the enable terminal instead for effective operation of the sensor.



### *Enable/Disable Response*

- When the sensor is enabled, it takes a light measurement and switches without any delay as follows:
  1) ON if measurement is dark.
  2) Nothing if measurement is in deadband.
  3) OFF if measurement is bright.
- When the sensor is disabled, it opens any auxiliary contact that is closed, and then pulses the OFF aux contact closed for 1 second. The relay output also switches OFF.



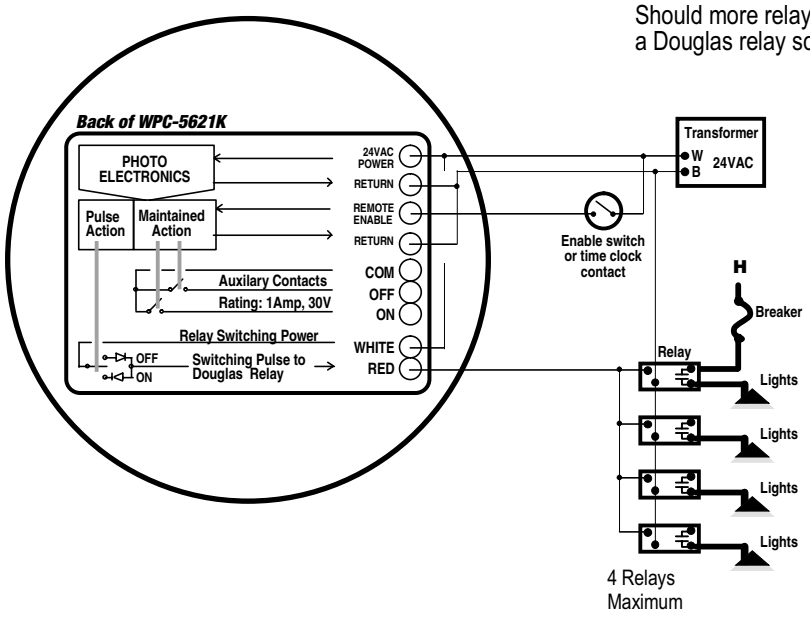
## *CONNECTIONS*

### *Douglas Relays*

The Douglas relay output functions the same as a standard Douglas relay switch. It can issue a unique ON or OFF pulse compatible with Douglas Relays.

Switch no more than 4 Douglas relays with the sensor's relay output. All of the relays will switch together.

Should more relays need to be controlled, connect the relay output to a Douglas relay scanner input.



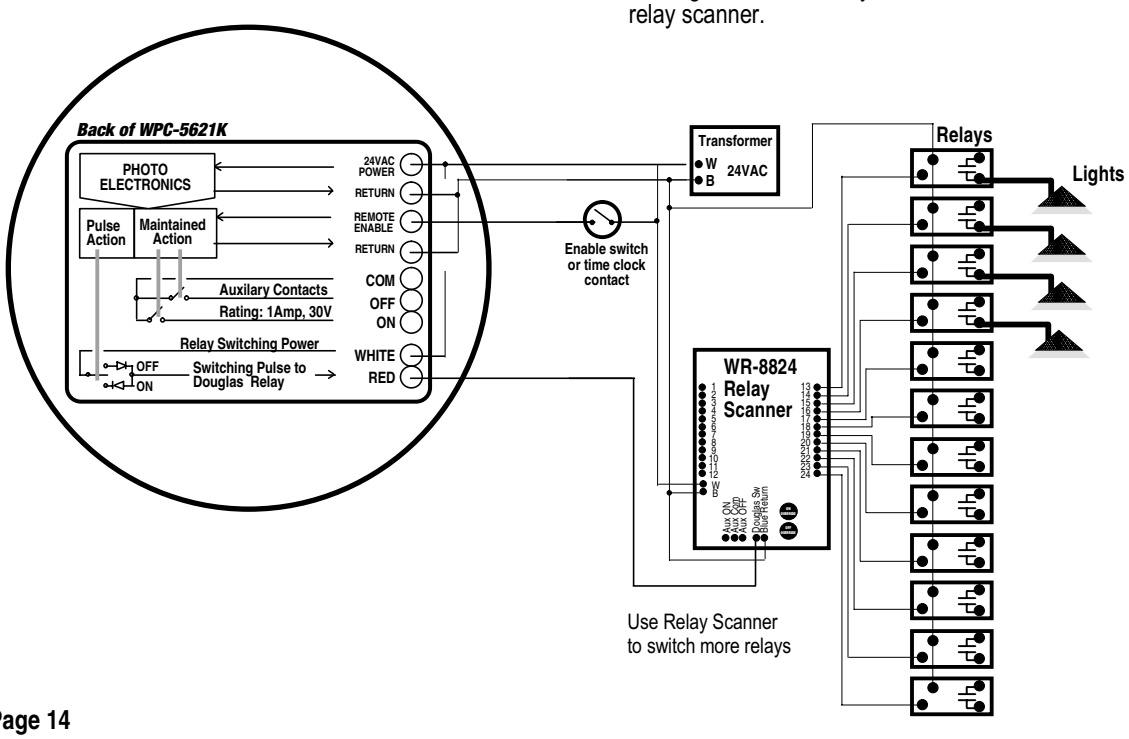



## *CONNECTIONS*

### *Douglas Relay Scanners*

The Douglas relay output functions the same as a standard Douglas relay switch and can be used to switch a relay scanner.

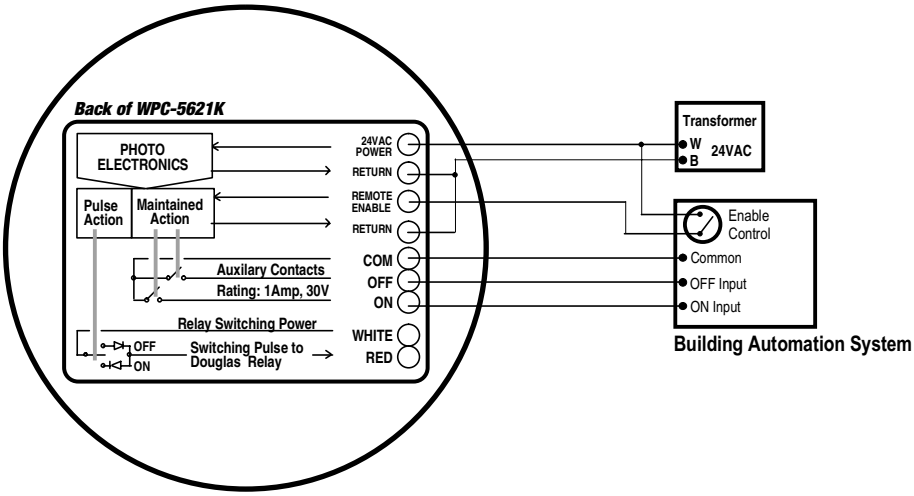
If a large number of relays need to be switched, use a Douglas relay scanner.



## *CONNECTIONS*

### *Contact Outputs to other Systems*

The daylight sensor has 2 auxiliary contacts, one for ON and one for OFF. Use these contacts to signal other control systems.



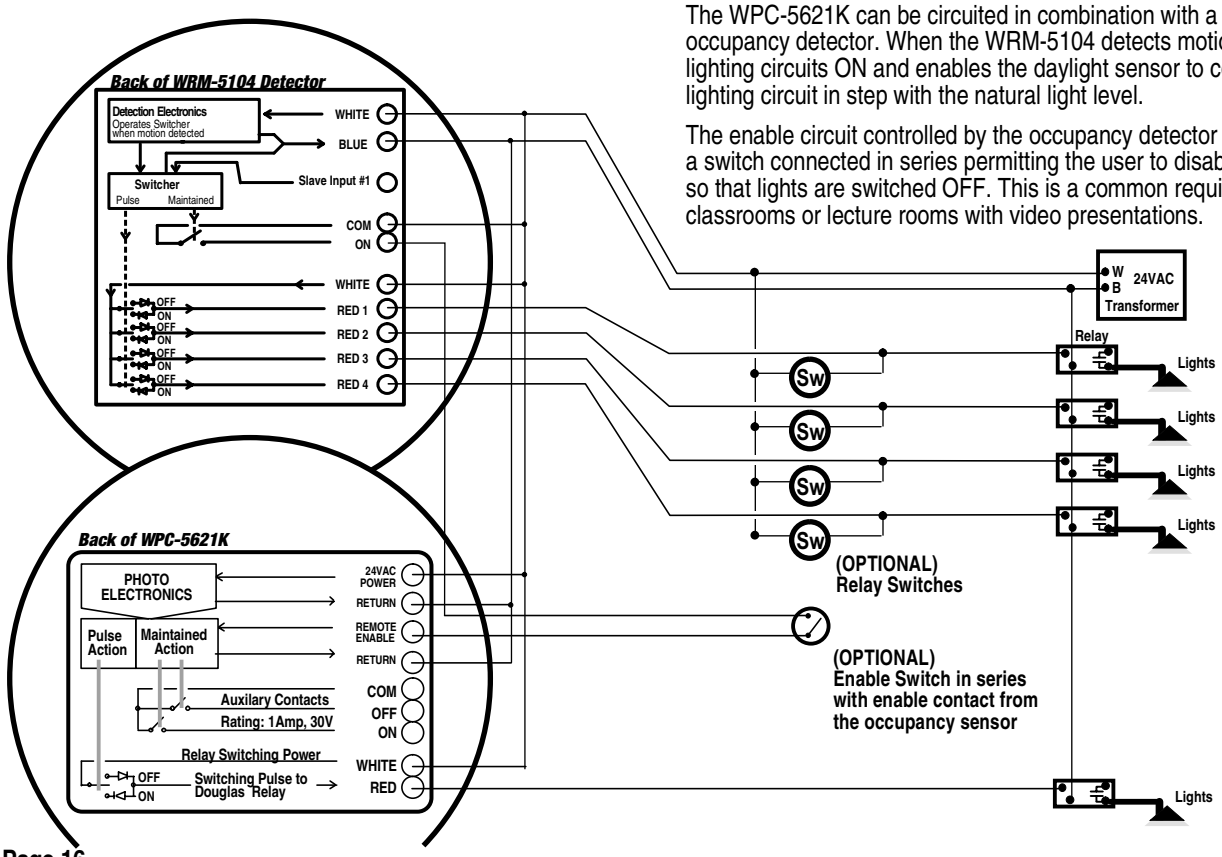


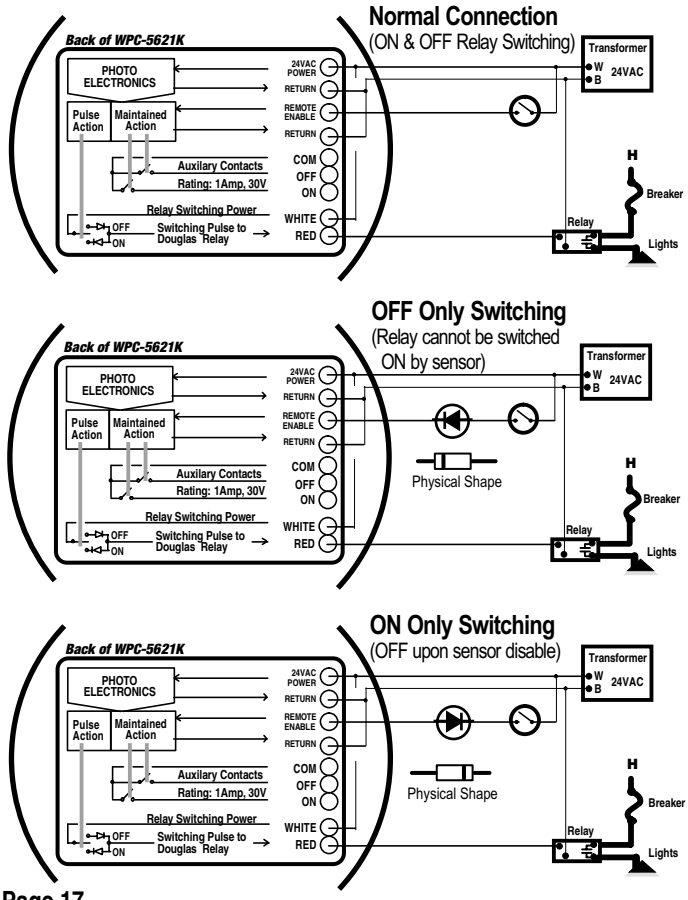

## *CONNECTIONS*

### *Daylight Sensor and Occupancy Detector*

The WPC-5621K can be circuited in combination with a WRM-5104 occupancy detector. When the WRM-5104 detects motion, it signals lighting circuits ON and enables the daylight sensor to control a lighting circuit in step with the natural light level.

The enable circuit controlled by the occupancy detector can also have a switch connected in series permitting the user to disable the sensor so that lights are switched OFF. This is a common requirement for classrooms or lecture rooms with video presentations.





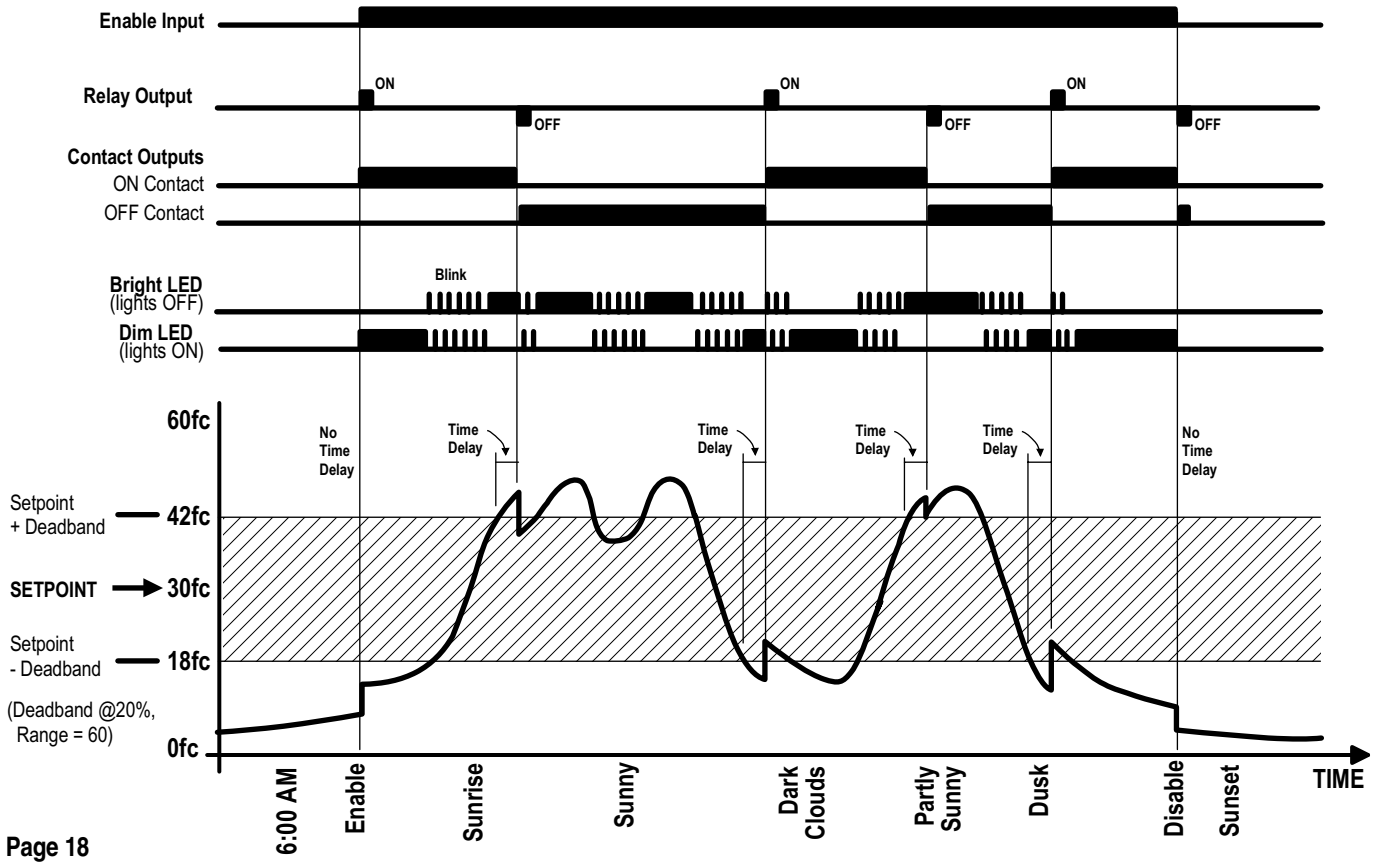

## *CONNECTIONS*

### *OFF Only or ON Only Relay Switching*

- The Enable/Disable terminal is used to enable and disable the daylight sensor. Upon enable the sensor will signal ON, OFF, or do nothing depending upon the current light level. After enable, the sensor will signal in step with the measured light level as it changes enough to cross the setpoint. Upon Disable the sensor will signal OFF.
- In some applications, it is desired that the sensor only switch ON or only switch OFF. This can be achieved by installing a diode into the enable/disable circuit. The diode will force the sensor to switch the Douglas relay output in the ON Only or OFF Only manner. The Aux contacts are not inhibited by the diode and will always function.
- Upon Disable the sensor will switch the relay output OFF, even if the ON Only option is selected.



## *TYPICAL SWITCHING SEQUENCE for WPC-5621K*



## *WARRANTY*

DOUGLAS products are warranted for one year from the date of purchase by the consumer against defects due to materials and the company's worksmanship only. The sole obligation hereunder shall be to repair, or at the company's option to replace, products as aforesaid, provided same are returned, upon authorization, 'Transportation Prepaid' to the company's Burnaby, CANADA office within the said period. Defects or failures due to improper or careless installation, storage or handling, or usage other than rated conditions, are specifically excluded from this warranty. No liability is accepted for return transportation charges following repair or replacement as aforesaid or for reinstallation costs. No other liability of any nature or kind, whether arising out of or from the use of the product, whether or not defective, is assumed.

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