WattStopper®

HB350*

High Bay • Line Voltage • Passive Infrared Occupancy Sensor Power Module

Installation Instructions

DESCRIPTION AND OPERATION

The HB350* occupancy sensors are designed for automatic lighting control in warehouse high bay applications. All models contain a passive infrared sensor (PIR). The HB350 series sensors are modular and are made up of two parts, a Power Module (HB350*) and a Lens (HBLx). The coverage area is determined by the lens module. The lenses are interchangeable with any HB3xx series sensor. See the Coverage Guide for more information.

All models in the HB350 series use a set of DIP switches to set the time delay and PIR sensitivity. The HB350 basic model provides a single load controlling relay. The HB350D adds daylighting control and the HB350DR adds a second load controlling relay. The sensor features can be configured using the DIP switches, as explained on page 3.

Daylighting (HB350D and HB350DR only)

When Daylighting control is enabled, the sensor turns OFF the luminaire after the ambient light level goes above and stays above the adjustable setpoint for 3 minutes, regardless of occupancy. The sensor turns ON the luminaire after the ambient light level goes below and stays below the adjustable setpoint for 45 seconds, if the occupancy requirements have been met (as set in the DIP switches). The delays, combined with a 20% deadband, help avoid cycling the luminaire unnecessarily.

The HB350D has one relay and is designed to control a load according to both occupancy and ambient light. The HB350DR has two load relays, one controlled by occupancy, the other controlled by occupancy and ambient light. The dual relay model can control separate loads in the same fixture, allowing for energy conservation by turning OFF one set of lamps in a fixture when there is enough daylight and allowing the second set of lamps to be controlled solely by occupancy. This permits having some artificial light when a space is occupied even though the rest of the fixture is held OFF due to ambient light.

Daylighting models can measure light levels either by looking up toward a skylight, or down toward the task area. Choose the most effective way to measure the light level then use a small flat-blade screwdriver to pry off the appropriate lens cover.

- To look up toward a light source such as a skylight, remove the lens cover from the top of the daylight sensor.
- To look down toward the task area, remove the lens cover from the bottom of the daylight sensor.

COVERAGE

Coverage patterns, density and range, are determined by the type of Lens attached to the HB350*.

For a complete description of each lens coverage pattern, see the HBLx Lens COVERAGE GUIDE.

HB350D with HBL3 low bay lens

HB350D with HBL1 aisleway lens

SPECIFICATIONS

HB350* Power Module

Voltages 120/277VAC, 60Hz

Load Requirements (each relay)

@ 120VAC, 60Hz ..... 0-800W ballast or tungsten

@ 277VAC, 60Hz ..... 0-1200W ballast

@ 120VAC ..... 1/6 hp

HB350D* Power Module (Daylighting features)

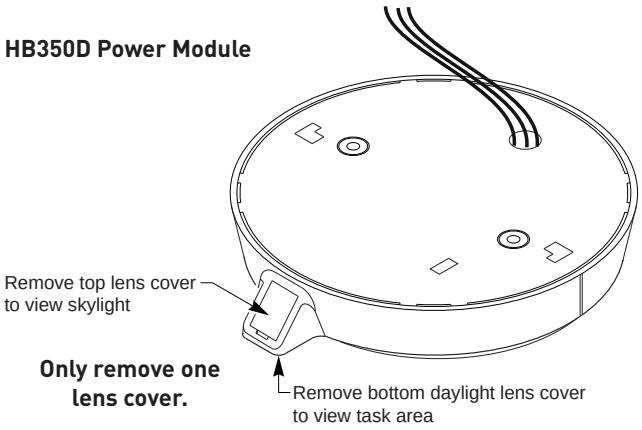
Light Level 2-200fc

Adjustment ..... Trimpot

US Patents: ..... 5,640,113 and 5,804,991

* The HB350 is the base model providing PIR occupancy sensing and a single load controlling relay. Daylighting features are added to the HB350D. The HB350DR has Daylighting and two load controlling Relays.

HB350D Power Module



Only remove one lens cover.

INSTALLATION

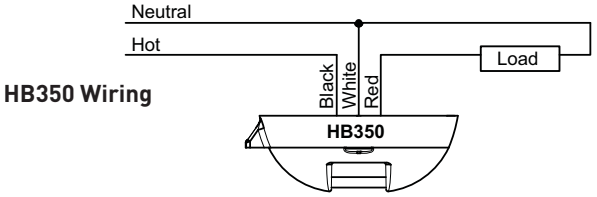
CAUTION

TURN THE POWER OFF AT THE CIRCUIT BREAKER BEFORE INSTALLING THE SENSOR.

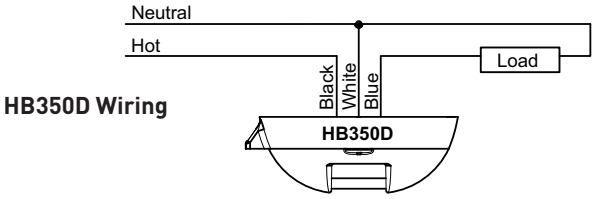
1. Determine the mounting location appropriate to the features of the power module and the coverage area. Careful consideration must be given to sensor placement. Avoid placing the sensor where the edge of the fixture, shelving or other obstructions may block the sensor's line of sight. Mount the sensor below the edge of the fixture and away from the fluorescent lamps so that the heat from the lamps does not affect the sensor.

   Daylighting models must be located so that the daylight sensor on the unit is not obstructed. (See Daylighting.)
2. Make sure that you have the appropriate accessories for the sensor mounting configuration. (See Mounting Options.)
3. Assemble any necessary mounting accessories and attach them to the power module, making sure that the flying leads from the power module are accessible.
4. Connect the line voltage and load wires to the sensor leads as shown in the Wiring Diagram for the unit's application.
   - Do not allow bare wire to show.
   - Make sure all connections are secure.
5. Attach the Lens to the HB350* as shown in the assembly drawing on the next page.
6. Restore power from the circuit breaker.

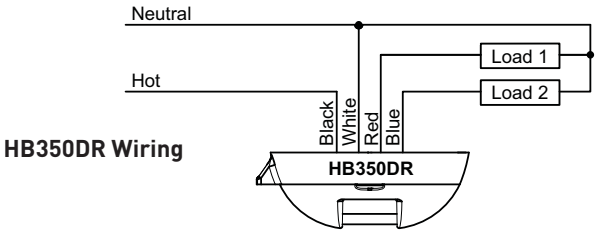
WIRING



HB350 Wiring



HB350D Wiring



HB350DR Wiring

MOUNTING OPTIONS

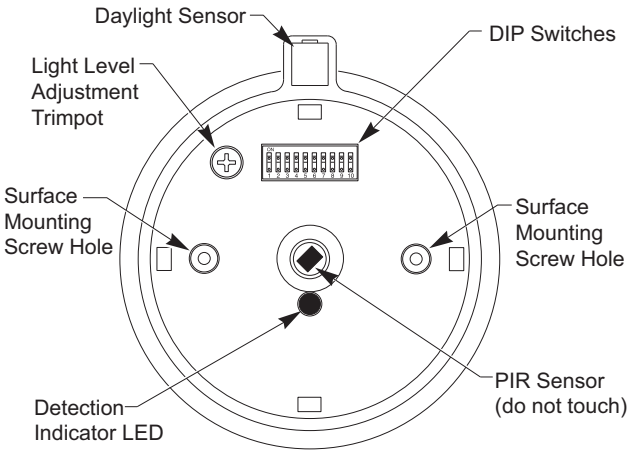
The HB350* can be attached to the fixture or junction box using the back box and chase nipple or directly to the fixture surface via the two screw holes provided in the Power Module (see Surface mounting below). The Extender Module (HBEM3) allows attaching the sensor to the side of the fixture in a number of configurations using provided chase nipples.

Back box mounting requires a standard 1/2" knockout for the chase nipple. The Power Module mounts to the back box with a bayonet type fitting requiring a slight twist of the units to separate them or lock them into place. The box comes ready for side mounting. It can be modified for rear mounting as follows:

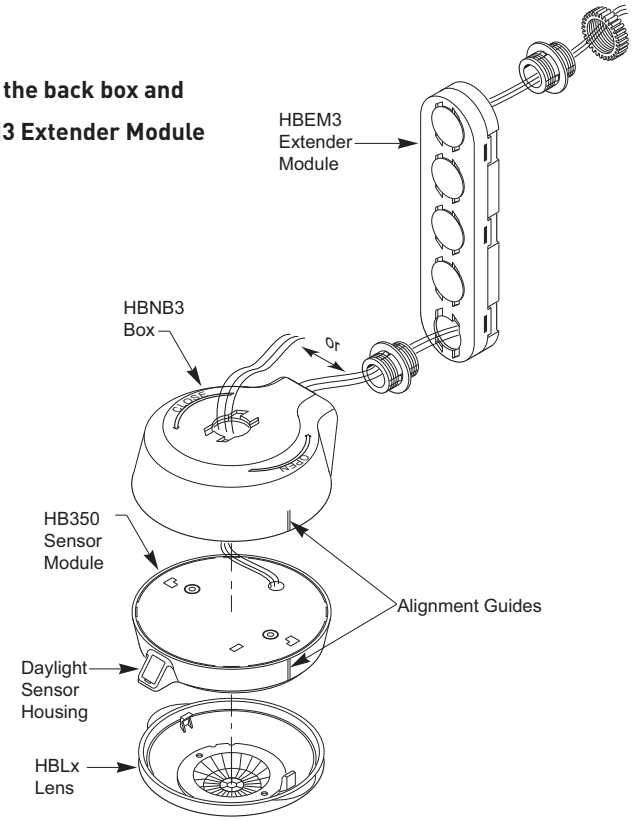
1. Pop out the cap in the rear knockout.
2. Un-snap the chase nipple from the side mount and snap into the rear mounting hole.
3. Use the cap to close the side mount hole.
4. The chase nipple provided can be pushed into a standard 1/2" knockout in a metal fixture [max of 1 mm (0.04") thick metal] without the need for the included internal nut. The nut can be used for added security if necessary.

The HBEM3 extender module allows threading the wires through its chase nipples and into the fixture for connection. The two sides of the HBEM3 are then snapped together to protect the wires. The short chase nipple is designed to snap into the HBNB3 connection box while the longer chase nipple snaps into any metal fixture or connection box with a standard knockout. The caps on the HBEM3 can be removed in various configurations to allow moving the chase nipples and adjusting the height of the sensor on the fixture.

Surface mounting requires holes in the fixture to pass wires and attach two screws through the surface mounting screw holes on the component side of the Power Module as shown below.



Using the back box and HBEM3 Extender Module



ADJUSTMENTS

Sensor factory pre-sets are as follows (default settings are **bold**):

Factory Switch Settings

1	2	3	4	5	6	7	8	9	10
ON	**OFF**	**OFF**	**OFF**	**OFF**	**ON**	**ON**	**OFF**	**OFF**	**OFF**

PIR Sensitivity (switches 1 & 2) .. **Medium 85%**

Time Delay (switches 3-7)..... **15 minutes**

Overrides (switches 8-10) ..... See table below for each model. N/A = not applicable, no effect.

Light level trimpot ..... "D" models only: Maximum, fully clockwise: when light level is above 200fc, the sensor turns OFF the load.

PIR Sensitivity (Switches 1-2)

The factory setting of 85% is suitable for most applications, but it may be necessary to adjust the PIR sensitivity if there is any environmental interference causing false triggers or if sensitivity needs to be increased for your particular application. Use DIP switches 1 & 2 to adjust sensitivity.

Switch	1	2	PIR SENSITIVITY
	OFF	OFF	100% (HIGH)
	ON	**OFF**	**85% (MEDIUM)**
	OFF	ON	75% (LOW)
	ON	ON	60% (LOW)

Time Delay (Switches 3-7)

Use DIP switches 3 to 7 to adjust the time delay.

Switch	3	4	5	6	7	TIME DELAY
	ON	ON	ON	ON	ON	15 seconds[Δ]
	OFF	ON	ON	ON	ON	5 minutes
	OFF	OFF	ON	ON	ON	10 minutes
	OFF	**OFF**	**OFF**	**ON**	**ON**	**15 minutes**
	OFF	OFF	OFF	OFF	ON	20 minutes
	OFF	OFF	OFF	OFF	OFF	30 minutes

[Δ] HB350 is 15 seconds, HB350D and HB350DR are 30 seconds

PIR and Light Level Overrides (Switches 8-10)

Overrides can disable control features of the HB350* power module. The table at the bottom of this page describes the override functions of each HB350* model.

Setting the Light Level Adjustment Trimpot

The light level setpoint is factory set at maximum (>200fc) with the trimpot fully clockwise.

After the sensor is installed the trimpot can be adjusted (counter-clockwise) so that the fixture turns OFF at a lower ambient light

MODEL/SWITCH #	8	9	10	FUNCTIONALITY	LOAD EFFECT
HB350 PIR sensor, 1 load relay	**OFF**	**OFF**	**OFF**	**Occupancy control enabled**	**Controlled by Occupancy.**
	ON	OFF	OFF	Override PIR	Load always ON.
HB350D PIR sensor + Daylighting 1 load relay	**OFF**	**OFF**	**OFF**	**Occupancy & Daylighting control enabled**	**Load turns ON when occupancy detected, if not held OFF by daylighting control.**
	OFF	ON	OFF	Override PIR	Load controlled by daylighting only: load turns ON when light level is below setpoint, load turns OFF when light level is above setpoint.
	OFF	OFF	ON	Override Daylighting	Load controlled by occupancy only.
	OFF	ON	ON	Override PIR & Daylighting	Load always ON.
HB350DR PIR sensor + Daylighting 2 load relays: R1 occupancy only R2 occupancy + Daylighting	**OFF**	**OFF**	**OFF**	**Occupancy & Daylighting control enabled**	**R1 load controlled by Occupancy R2 load controlled by Occupancy & Daylighting.**
	ON	OFF	OFF	Override PIR (both relays)	R1 load always ON. R2 load controlled by daylighting only: load turns ON when light level is below setpoint, load turns OFF when light level is above setpoint.
	OFF	ON	OFF	Override PIR on Relay 2	R1 load controlled by occupancy. R2 load controlled by daylighting only: load turns ON when light level is below setpoint, load turns OFF when light level is above setpoint.
	OFF	OFF	ON	Override Daylighting	Both load relays controlled by occupancy only.
	OFF	ON	ON	Override PIR on Relay 2 Override Daylighting	R1 load controlled by occupancy. R2 load always ON.
	ON	ON	ON	Override PIR (both relays) Override Daylighting	Both loads always ON.

level. Adjust the trimpot while the ambient light provides enough light at the work surface. Do not block the daylight sensor. Be aware of reflective surfaces that might affect light levels. Make adjustments in small increments (1/8th of a turn), waiting 3 minutes between them for the sensor to react to the change.

When the fixture turns OFF, the sensor is set for the light level present at that time. Come back to the area when the ambient light level drops. Make sure the fixture turns ON early enough so that the area served by it is not in darkness. If it doesn't, make a slight clockwise adjustment so that the lights turn ON earlier.

IMPORTANT START-UP INFORMATION

A 60-second start-up period occurs during initial installation and after a power failure of 5 minutes or more. After applying power to the sensor wait at least 60 seconds for the sensor to begin detecting occupancy and the load to turn ON. Regardless of light level the load may turn ON during the start-up period, depending on the state of the relay when power was off.

- If the sensor detects occupancy during the start-up, when the load turns ON it stays ON as long as the sensor continues to detect motion, plus the Time Delay.
- If no occupancy is detected during the 60-second start-up, the load may come on anyway during the start-up. If no occupancy is detected by the time the start-up is complete, the relay opens and the load turns OFF.

TESTING

1. When mounting and wiring are complete, cover up the sensor to prevent it from detecting motion.
2. Apply power to the sensor and light fixture. Lights may turn ON during the 60-second start-up period.
3. Wait for the start-up period to end. For the next 1 to 2 minutes the sensor runs through a self-diagnostic routine.
4. If the load came on during the start-up period, wait for it to turn OFF, indicating the self diagnostic routine is complete.
5. Uncover the sensor and confirm that when the sensor detects motion, it's red LED blinks and the light turns ON.
6. Disconnect power.
7. Attach the lens as shown in the assembly drawing. Tighten securely to ensure that seal is complete.

TROUBLESHOOTING

To confirm proper operation, review the Start-Up and Testing information.

Red LED on sensor module does not blink:

Check for proper sensor wire connections and make sure they are tightly secured.

Red LED blinks but lights do not turn ON:

1. Make sure that power to the sensor has been ON continuously for at least one minute, then
   a) Turn OFF power to the sensor. The relay will close.
   b) Turn ON power to the sensor. The load should come ON. If not, continue with step 2.
2. If the power module has the light level feature (model number contains "D"), cover the light sensor lens to simulate darkness. If the light turns ON, the light level setting needs to be adjusted. If set for minimum, more than 2fc of ambient light causes the lights to be held OFF. See ADJUSTMENTS: Setting the Light Level Adjustment Trimpot.
3. Check power connections to the light fixture.
4. Check all sensor wire connections. Verify the load wire is tightly secured.

Lights will not turn OFF:

1. If there is no motion from people or equipment in the sensor's view but the red LED blinks, look for any nearby source of infrared energy (heat) in motion, such as turbulent air from a heating or cooling supply, or other sources such as heat from the fluorescent lamps in the fixture.
   - Mount the sensor so that it's lens is below the edge of the fixture and does not directly view the lamps.
   - Divert the air supply away from the sensor, or move the sensor.
2. Verify time delay set in switches 3-7. The time delay can be set from 15 seconds to 30 minutes. Ensure that the time delay is set to the desired delay and that there is no movement within the sensor's view for that time period.
3. Check PIR and Light Level Override DIP switch settings. If all control functions are overridden the load stays ON.
4. Check sensor wire connections. Verify load and neutral wires are secure.

ORDERING INFORMATION

Catalog #	Description
A complete high bay line voltage occupancy sensor consists of:	
HB350*-B	Power Module and back box with 2 chase nipples and nuts; 1 short (0.88") for connection to plastic, 1 long (1.24") for connection to metal
HBL#	Lens (# indicates the lens number, see COVERAGE GUIDE)
HBEM3	Extender module with 2 chase nipples and nuts 1 short (0.88") for connection to plastic, 1 long (1.24") for connection to metal

* See available feature suffix indicators below:

D indicates daylight feature

DR indicates daylight plus second relay

C is for colder ambient temperature applications: -40° to 131°F (-40° to 55°C)

All units are White.

A Group brand legrand

WARRANTY INFORMATION

WattStopper warranties its products to be free of defects in materials and workmanship for a period of five (5) years. There are no obligations or liabilities on the part of WattStopper for consequential damages arising out of, or in connection with, the use or performance of this product or other indirect damages with respect to loss of property, revenue or profit, or cost of removal, installation or reinstallation.

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