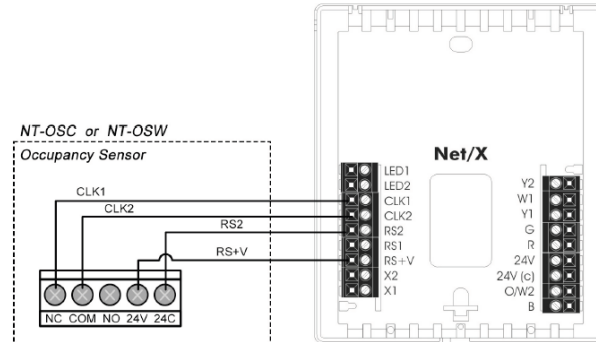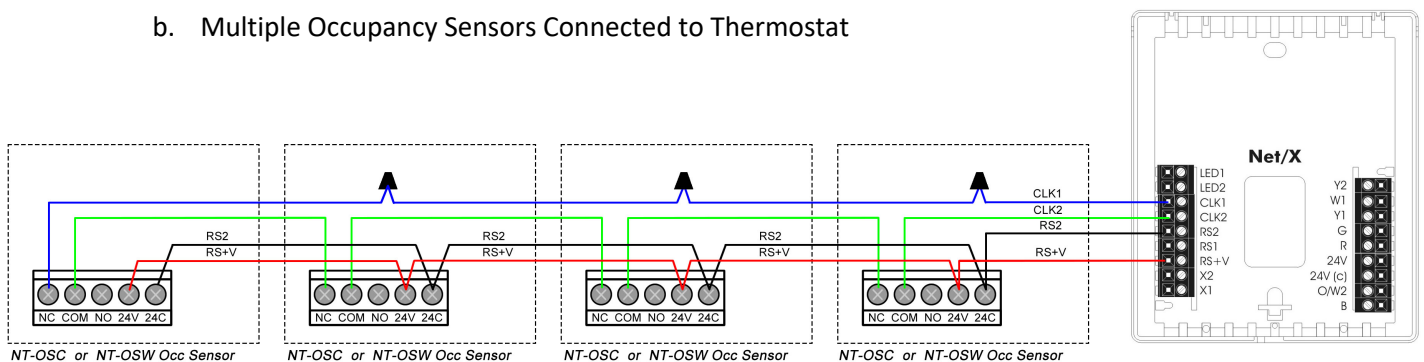# Occupancy Sensor HVAC Control

1. Install thermostat back plate and connect to network per thermostat installation instructions

2. Pull 4-conductor cable (or CAT5) from thermostat to occupancy sensor location and wire according to the diagrams below.

   a. Single Occupancy Sensor Connected to Thermostat

   b. Multiple Occupancy Sensors Connected to Thermostat

   In a daisy chain fashion, connect all 24V together and then all 24C together as shown. Daisy-chain from CLK2 to COM on the first sensor, then NC to the COM of the second sensor, etc. On the last sensor in the chain, connect the NC to CLK1 using the fourth conductor by connecting each segment with a wire nut as shown above.

   * NOTE: It may be required to add a separate (or larger) 24vac transformer to power more than one occupancy sensor. If so, thermostats and occupancy sensors must have the same 24VAC / 24V(c) polarity on all units. 75VA transformer is recommended at the equipment if powering the equipment board, thermostat and four sensors.

   If using more than four (4) sensors, follow the same wiring scheme as above, allowing 1VA per transformer at 24VAC. Occupancy sensors must have the same 24VAC / 24V(c) polarity on all units.

c. Ensure both jumpers are at position A and perform Walk By Test per occupancy sensor installation instructions
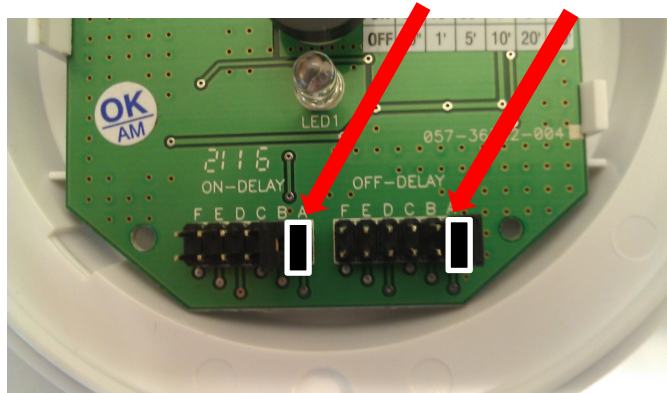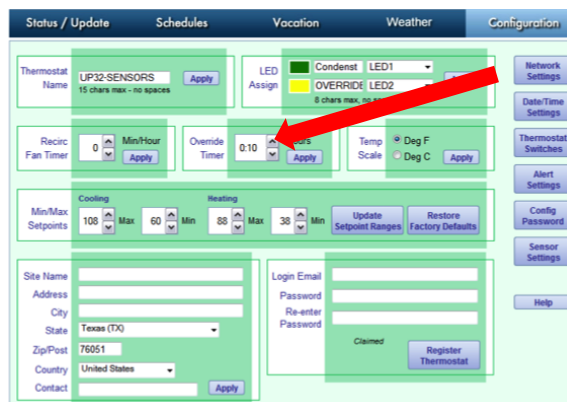

NT-OSC Ceiling Mount Sensor Walk By Test Jumper Settings
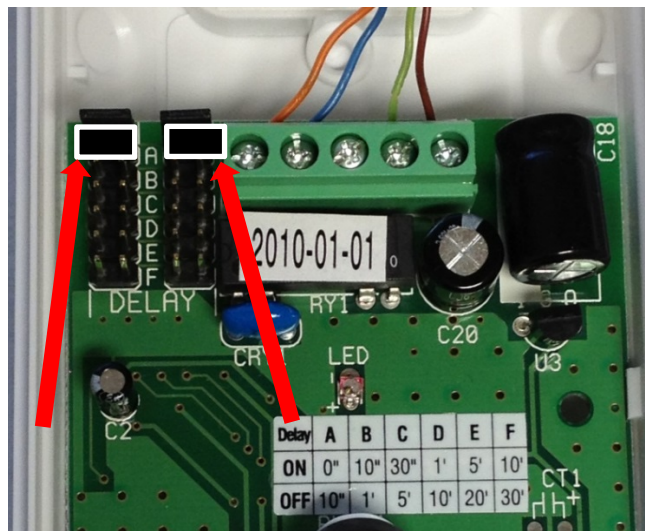
NT-OSW Wall Mount Sensor Walk By Test Jumper Settings

3. Update Occupancy Sensor and thermostat for HVAC control
   a. Recommend set thermostat Override Timer to 10 minutes, or longer. Override Timer must NOT be 0:00. (in configuration page)

4. Update Occupancy Sensor jumper settings for HVAC control

   a. Set Verify (ON) (Occupancy Detection) to jumper setting E (5 minutes)

   b. Set Minimum Occupied (OFF) (HVAC Run Time) to jumper settings E (20 minutes) or F (30 minutes). Thermostat override will continue for duration of Min Occ (OFF) time.

	A	B	C	D	E	F
Verify (ON)	0 sec.	10 sec.	30 sec.	1 min.	5 min.	10 min.
Min Occ (OFF)	10 sec.	1 min.	5 min.	10 min.	20 min.	30 min.

NOTES: *When changing Occupancy Sensor jumper settings, recycle Occupancy Sensor power by removing and reattaching the thermostat faceplate*

5. Secure cover on occupancy sensor

6. Set dipswitches on back of the thermostat faceplate to turn off Adaptive Recovery (#2 ON) if desired (but not required) and engage the Lockout (#4 ON) (required). (this web page may look different on your specific thermostat model)
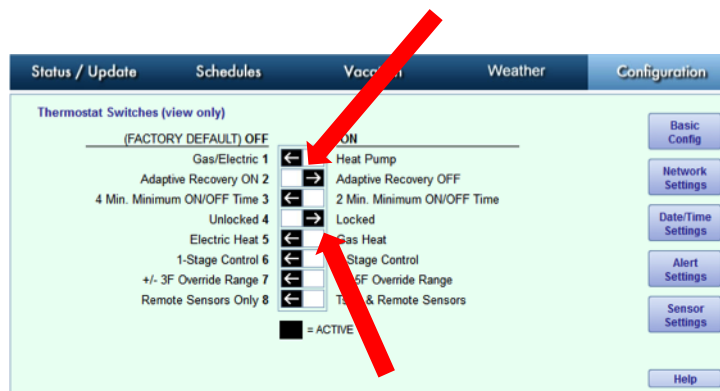

Occupancy Control Dipswitch Settings

7. Place thermostat face plate on thermostat back plate

8. Set Occupied & Unoccupied schedule
    a. Set Occupied schedule to 30 minutes before anticipated occupied time (or HVAC run time so that the space is at the desired occupied set point).

    b. Set an Unoccupied schedule to 30 minutes after anticipated occupied time. Use set back set points that are easy for the HVAC unit to obtain the desired occupied set points during normal occupied hours.

    c. Set a 2nd Unoccupied schedule to 30 minutes after normal occupied hours. Use set points that will maximize energy savings during unoccupied hours.
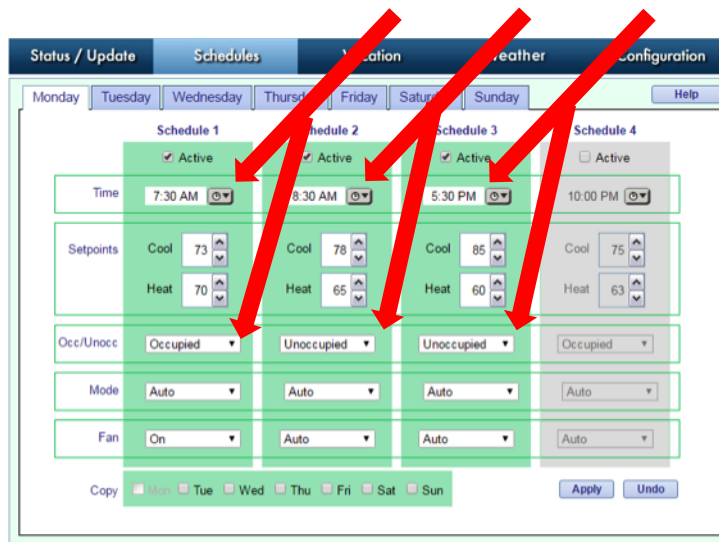
Summary: The preceding instructions configured the HVAC equipment for occupancy sensor control.
This scenario assumes a classroom setting with a start time of 8:15. The teacher arrives at 8am so preconditioning begins 30 minutes prior at 7:30am. If the room remains unoccupied, the schedule sets the HVAC to "light" set back (unoccupied) mode at 8:30am. At the end of the day, the thermostat will set the HVAC into a "heavy" set back (unoccupied) mode at 5:30pm.

1. *The area will be preconditioned to the Occupied Set Points (cool = 74°F, Heat = 68°F) beginning 30 minutes prior to anticipated room occupancy of 8am.*

2. *If no occupancy is detected during normal occupied hours, the schedule will set the HVAC equipment into Unoccupied (or light set back) mode (cool = 78°F, heat = 65°F) 30 minutes after anticipated room occupancy of 8am. Use a light set back such that the HVAC unit can easily reach desired occupied set points during normally occupied hours.*

3. *If no occupancy is detected during normal unoccupied hours, the schedule will set the HVAC equipment into Unoccupied (or heavy set back) mode (cool = 85°F, heat = 60°F) 30 minutes after anticipated room occupancy of 5pm. Use a heavy set back to maximize energy savings during normally unoccupied hours.*

4. *If occupancy is detected at any time, the HVAC equipment will continue conditioning the area in Override using that last run Occupied set points for the duration of room occupancy.*

5. *The Override (Occupied) mode will continue for a maximum of 20 minutes after the room is vacated.*

6. If the thermostat is in Unoccupied Mode, a minimum of 6 minutes (in the example) of continuous occupied time is necessary before the occupancy sensor will place the thermostat back into Override (Occupied) Mode.

Notes:

a. The Occupancy sensor will trigger an Override (HVAC conditions to Occupied set points) when the integrated occupancy sensor relay OPENS. An Override will condition the space to the last run occupied set points.

b. The thermostat must recognize that an Occupancy Sensor is connected to the CLK1 & CLK2 terminals by detecting a short between CLK1 & CLK2 (i.e. the Occupancy sensor must NOT detect occupancy at least one time with the thermostat face plate ON before the thermostat recognizes that the occupancy sensor is connected).

c. Verify (ON) (occupancy detection) has a built in delay of 1 minute. Thus, if Verify (ON) is set to 5 minutes, the Occupancy Sensor will activate an Override after 6 minutes of continuous occupied time.

d. If a time delay relay is being used as a door contactor in conjunction with the occupancy sensor, ensure that the relay is normally OPEN when the door is closed.