

Why Commission Lighting Control Projects?

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Advanced lighting controls can contribute to energy-efficient, productive, higher-value buildings. Automatic switching and dimming controls are typically used to achieve significant energy savings via occupancy sensing, scheduling, load shedding, daylight harvesting and other strategies. Manual dimming controls can save energy but their primary purpose is to support visual needs. Lighting controls enable lighting designers to control how much light is produced and ensure light is produced only when needed.

Commissioning the lighting control system is often a critical component of the design and installation process, and can distinguish whether a project will succeed or fail. Commissioning can help ensure proper equipment operation, user acceptance and intended energy savings in both new construction and renovation projects.

Florida Power & Light, a U.S. electric utility, defines commissioning as a “systematic process of ensuring that all building systems perform interactively according to the documented design intent and the owner’s operational needs.” This can include factory start-up, sensor calibration and owner notification of the operation and intent of the control systems.

Before commissioning: Optimal commissioning occurs when it is planned and budgeted. The system’s designer should provide a controls “narrative” that describes the functionality of the control system, details the commissioning requirements in the project specifications, and includes a sequence of operations for each control point.

Factory start-up: Factory start-up occurs prior to the commissioning process and entails the manufacturer or its representative ensuring that its products performs as intended within the designed system. Factory-startup is also considered the first step in calibration.

Field calibration: Calibration entails adjusting sensors, such as occupancy sensors and photosensors, so that they operate properly within actual field conditions.

In the case of occupancy sensors, the factory default settings (time delay and sensitivity) can be tuned to application conditions to ensure proper operation and expected energy savings. For example, a small difference in the time delay setting can translate to a significant difference in energy savings and lamp life, while a small difference in the sensitivity setting can make a significant difference in whether the lights are activated only when the space is occupied, and deactivated only when it is unoccupied.

In the case of photosensors, the sensor must be calibrated according to field conditions. For example, a photosensor in a room with light-painted walls will respond differently than a photosensor in a room right next door with dark-painted walls. This small difference in application conditions can make a big difference in controls system performance and energy savings for the owner.

In older systems, sensors are calibrated mechanically. In newer systems, sensors may be calibrated using software.

Field commissioning: Commissioning should involve all members of the design and construction team and is typically led by the commissioning agent, who may be an electrical contractor, commissioning specialist, manufacturer technician or some other professional.

Field commissioning requires systematic testing of all controls in the building to ensure that they provide specified performance and interact properly as a system. During commissioning, it is helpful to understand the sequence of operation for each control point, which should be tested to ensure that the control system delivers desired results based on typical operating conditions. Besides operating factors, other factors such as location of controls should be considered during field commissioning. In addition, commissioning may entail programming of microprocessor-based controls. Time of day, override and event scheduling must be programmed and tested as well.

The entire construction team should ensure that commissioning is not removed as a cost-saving measure.

After commissioning: After commissioning, the commissioning agent should tell the owner and the users about the intent and functionality of the controls, especially about overrides, local control capability that allows users to override a schedule or master command. In addition, the commissioning agent should turn over all documentation and instructions to the owner's maintenance personnel so they can maintain and re-tune the system as needed, implying that calibration and commissioning is an ongoing process. It is recommended that maintenance personnel inspect all lighting controls for proper operation at least once per year.

Table. Typical lighting control commissioning and calibration activities.

Control Type	Commissioning and Calibration
Occupancy sensors and photosensors	Ensure that the sensor is correctly placed and oriented per the specifications and/or construction drawings. If unanticipated obstructions are present, it may be necessary to adjust the sensor location and orientation.
Occupancy sensors	Adjust the sensitivity and time delay of the occupancy sensor, and test to ensure it provides appropriate response. For optimal user acceptance, energy savings and lamp life, set the time delay initially for a minimum of 15 minutes (NEMA recommendation).
Daylight harvesting	All furnishings and interior finishes and materials should be installed before calibrating the sensors. Adjust the photosensor to determine the threshold for switching based on detected light level. It may be helpful to calibrate under normal daylight conditions and dusk conditions (it may be possible to close window blinds to approximate dusk). Record the calibration adjustments if possible and replicate in similar spaces.
Automatic shut-off ("sweep off")	Input the schedule into the programmable scheduling controls, incorporating weekday, weekend and holiday operating times. Ensure that overrides work and that they are located conveniently for users.
Dimming systems	It is recommended that fluorescent lamps be "seasoned" before dimming by operating them at full light output, so as to ensure uniform dimming performance across all lamps in a system. Recommendations vary, but NEMA recommends seasoning fluorescent linear lamps overnight, or about 12 hours, and compact fluorescent lamps for 100 hours, prior to dimming. Consult the lamp manufacturer to determine whether the select lamp type must be seasoned and for how long prior to dimming.
Manual dimming	Ensure correct placement of the dimmer per the construction drawings. Adjust the upper limit of the dimming range according to the task being performed, and set the lower limit of the range so that the minimum light level meets the use/application of the space.