About ETC

ETC is a global leader in the manufacture of award-winning lighting-control systems, backed by our renowned 24/7/365 support. ETC offers complete solutions for any indoor or outdoor application, including office buildings, houses of worship, retail spaces, hospitality, and more. Our product lines include all the equipment necessary to meet stringent environmental codes, including occupancy and vacancy sensors, dual tech sensors, astronomical time clocks, centralized and distributed systems, wired and wireless controls, LED fixtures, power-control systems, and emergency lighting.
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About IECC

The International Energy Conservation Code (IECC) emphasizes energy conservation and is a model code for residential and non-residential buildings. It is a “model” code because while the International Code Council develops the code, they leave it up to individual jurisdictions to adopt it. IECC 2018 establishes minimum regulations for lighting efficiency using prescriptive and performance-related provisions. To comply with the code, designers need to incorporate the use of advanced lighting controls like daylight and occupancy/vacancy sensors as well as multi-level control demand response capability. IECC is updated every three years.

About this guide

ETC developed this guide as a way to help designers quickly and easily create systems that fulfill all the requirements of IECC. Its illustrations are meant to be a useful reference guide to standard ETC installations that designers can use as templates to help their project reach compliance. Designers, engineers, and contractors can also take advantage of ETC’s world-renowned customer service to receive help and guidance no matter what stage the product is in: design, submittal, or installation. To find out more, please contact your local ETC representative.

About Echo

The Unison Echo® control system offers flexible, scalable, and environmentally-friendly control – simply. Echo’s intelligent daylight and occupancy/vacancy sensors easily control lighting output while its topology-free, two-wire infrastructure means it’s easy to install anywhere and adhere to your budget. Simple and powerful, Unison Echo ensures you get the most from a system with the least amount of hassle.
<table>
<thead>
<tr>
<th>Control Requirement</th>
<th>Code Provision</th>
<th>Code Summary</th>
<th>Space Type</th>
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<tbody>
<tr>
<td>Manual-On or AutoOn ≤ 50%</td>
<td>C405.2.1.1.2</td>
<td>Automatically controlled spaces must be controlled to automatically turn the lighting on to not more than 50% power</td>
<td>✓ ✓ ✓ ✓</td>
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<tr>
<td>Full Automatic On</td>
<td>C405.2.1.1.2</td>
<td>Automatically controlled spaces are allowed to turn on to full</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Auto-Off ≤ 50%</td>
<td>C405.2.1.2</td>
<td>Occupancy sensors shall automatically reduce lighting in warehouse aisle-ways and open areas by ≤ 50%</td>
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<td>Full Auto-Off via Occupancy Sensor</td>
<td>C405.2.1.1.1</td>
<td>Fixtures must automatically turn off within 30 minutes of all occupants leaving the space</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>Time-Switch Controls (via System Controller)</td>
<td>C405.2.2.1</td>
<td>Each area of the building not provided with occupant sensor controls shall be provided with time switch controls. These areas must also be provided with a manual override switch</td>
<td>✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>Light Reduction Controls</td>
<td>C405.2.2.2</td>
<td>Spaces shall have a manual control that allows the occupant to reduce the connected lighting load uniformly by at least 50%</td>
<td>✓ or</td>
</tr>
<tr>
<td>Manual Control (Local Switch)</td>
<td>C405.2.2.3</td>
<td>Areas shall incorporate a manual control to allow occupants to turn fixtures off</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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<tr>
<td>Daylight Responsive Controls</td>
<td>C405.2.3.1/2</td>
<td>Daylight-responsive controls shall be provided within each space with sidelight and toplight daylight zones totaling &gt; 150W</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
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**CODE REQUIREMENTS for common building spaces**
PRIVATE OFFICE: No Windows, 0-10V Dimming Fixtures

SUPPORTS THE FOLLOWING REQUIREMENTS:
- Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
- Manual Control (Local Switch) (C405.2.2.3)
- Lighting Reduction (C405.2.2.2)

SEQUENCE OF OPERATION:
Fixtures:
- All fixtures are dimmable
- All fixtures are controlled together
- Maximum level can be task tuned to any percentage during startup
Occupancy Control:
- Fixtures must be turned on manually (or optionally can be configured to come on automatically to 50%)
- Fixtures automatically turn off when room becomes vacant
Daylight Control:
- Not required for offices without windows or that have loads <150W in sidelight zone
Manual Control:
- On/off & raise/lower control of fixtures

ADDITIONAL OPTIONS
- Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
- Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
- Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info.)
- A complete range of UL924 and UL1008 emergency solutions are available

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<td>E-SPS</td>
<td>Echo Station Power Supply</td>
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PRIVATE OFFICE: Windows, 0-10V Dimming Fixtures

SUPPORTS THE FOLLOWING REQUIREMENTS:
• Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
• Manual Control (Local Switch) (C405.2.2.3)
• Lighting Reduction (C405.2.2.2)
• Sidelight Daylight Zone (C405.2.3.2)

SEQUENCE OF OPERATION:
Fixtures:
• All fixtures are dimmable
• All fixtures can be controlled together
• Maximum level can be task tuned to any percentage during startup

Occupancy Control:
• Fixtures must be turned on manually (or optionally can be configured to come on automatically to 50%)
• Fixtures automatically turn off when room becomes vacant

Daylight Control:
• Smooth continuous dimming
• Not required for offices without windows or that have loads <150W in sidelight zones

Manual Control:
• On/off & raise/lower control of fixtures

ADDITIONAL OPTIONS
• Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
• Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
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<td>4</td>
<td>1</td>
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<td>Echo Single-Zone Relay Controller</td>
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<td>5</td>
<td>1</td>
<td>E-SPS</td>
<td>Echo Station Power Supply</td>
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OPEN OFFICE: 0-10V Dimming Fixtures

SUPPORTS THE FOLLOWING REQUIREMENTS:
• Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
• Manual Control (Local Switch) (C405.2.2.3)
• Lighting Reduction (C405.2.2.2)
• Sidelight Daylight Zone (C405.2.3.2)

SEQUENCE OF OPERATION:
Fixtures:
• All fixtures are dimmable
• Each row controlled independently
• Maximum level can be task tuned to any percentage during startup

Occupancy Control:
• Fixtures must be turned on manually (or optionally can be configured to come on automatically to 50%)
• Fixtures automatically turn off when room becomes vacant

Daylight Control:
• Smooth continuous dimming
• Daylight zones defined by rows
• Not required for offices without windows or that have loads <150W in sidelight zones

Manual Control:
• Master on/off & raise/ lower control of fixtures
• Optional individual row or fixture control

ADDITIONAL OPTIONS
• Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
• Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
• Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info.)
• A complete range of UL924 and UL1008 emergency solutions are available

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<td>Echo Ceiling-Mount Light Sensor</td>
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<td>4</td>
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<td>ERMC8</td>
<td>Echo Room Controller</td>
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SUPPORTS THE FOLLOWING REQUIREMENTS:

- Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
- Manual Control (Local Switch) (C405.2.2.3)
- Lighting Reduction (C405.2.2.2)
- Sidelight Daylight Zone (C405.2.3.2)

SEQUENCE OF OPERATION:

Fixtures:
- All fixtures are dimmable
- Each row controlled independently
- Maximum level can be task tuned to any percentage during startup

Occupancy Control:
- Fixtures must be turned on manually (or optionally can be configured to come on automatically to 50%)
- Fixtures automatically turn off when room becomes vacant

Daylight Control:
- Smooth continuous dimming
- Daylight zones defined by rows
- Not required for areas without windows or that have loads <150W in sidelight zones

Manual Control:
- On/off & raise/lower control of each row

ADDITIONAL OPTIONS

- Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
- Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
- Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info.)
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<td>Echo Ceiling-Mount Light Sensor</td>
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<td>E-DVAC-C</td>
<td>Echo Dual Tech Ceiling-Mount Vacancy Sensor</td>
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<td>4</td>
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<td>ERMC4</td>
<td>Echo Room Controller</td>
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SUPPORTS THE FOLLOWING REQUIREMENTS:
• Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
• Manual Control (Local Switch) (C405.2.2.3)
• Lighting Reduction (C405.2.2.2)
• Sidelight Daylight Zone (C405.2.3.2)

SEQUENCE OF OPERATION:
Fixtures:
• All fixtures are dimmable
• Each row controlled independently
• Maximum level can be task tuned to any percentage during startup

Occupancy Control:
• Fixtures must be turned on manually (or optionally can be configured to come on automatically to 50%)
• Fixtures automatically turn off when room becomes vacant

Daylight Control:
• Smooth continuous dimming
• Custom grouping of fixtures into separate daylight zones (max number zones = number of fixtures)
• Not required for areas without windows or that have loads <150W in sidelight zones

Manual Control:
• Master on/off & raise/ lower control of entire room
• Optional scene control

ADDITIONAL OPTIONS
• Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
• Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
• Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info.)
• A complete range of UL924 and UL1008 emergency solutions are available

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<td>Echo Dual Tech Wall-Mount Vacancy Sensor</td>
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<td>Echo Single-Channel 0-10V Controller</td>
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<tr>
<td>6</td>
<td>1</td>
<td>ERC</td>
<td>Echo Single-Zone Relay Controller</td>
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<tr>
<td>7</td>
<td>1</td>
<td>E-SPS</td>
<td>Echo Station Power Supply</td>
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SUPPORTS THE FOLLOWING REQUIREMENTS:

- Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
- Manual Control (Local Switch) (C405.2.2.3)

SEQUENCE OF OPERATION:

Fixtures:

- All fixtures are dimmable
- Maximum level can be task tuned to any percentage during startup

Occupancy Control:

- Fixtures automatically go to full bright when occupied
- Fixtures automatically turn off or optionally can be configured to drop to low dim setting when space becomes vacant

ADDITIONAL OPTIONS

- Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
- Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
- Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info.)
- For sidelight/toplight daylight zones with a load >150W, add Echo Light Sensors for daylight control (C405.2.3.1/2)
- A complete range of UL924 and UL1008 emergency solutions are available

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<td>Echo Room Controller with TimeClock</td>
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SUPPORTS THE FOLLOWING REQUIREMENTS:
- Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
- Sidelight Daylight Zone (C405.2.3.2)

SEQUENCE OF OPERATION:

Fixtures:
- All fixtures are dimmable
- Controller can be configured to put fixtures into two zones
- Maximum level can be task tuned to any percentage during startup

Occupancy Control:
- Fixtures automatically go to full bright when occupied
- Fixtures automatically turn off or optionally can be configured to drop to low dim setting when space becomes vacant

Daylight Control:
- Smooth continuous dimming
- Not required for spaces without windows or that have loads <150W in sidelight zones

ADDITIONAL OPTIONS
- Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
- Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
- Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info)
- A complete range of UL924 and UL1008 emergency solutions are available

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<td>E-SPS</td>
<td>Echo Station Power Supply</td>
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SUPPORTS THE FOLLOWING REQUIREMENTS:
• Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)

SEQUENCE OF OPERATION:
Fixtures:
• All fixtures are dimmable
• All fixtures are controlled together
• Maximum level can be task tuned to any percentage during startup
Occupancy Control:
• Fixtures automatically go to full bright when occupied
• Fixtures automatically turn off or optionally can be configured to drop to low dim setting when space becomes vacant

ADDITIONAL OPTIONS
• Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
• Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
• Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info)
• For primary sidelight/toplight daylight zones with a load >150W, add Echo Light Sensors for daylight control (section 9.4.1.1[e/f])
• A complete range of UL924 and UL1008 emergency solutions are available

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SUPPORTS THE FOLLOWING REQUIREMENTS:
- Full Auto-Off via Occupancy Sensor (C405.2.1.1.1)
- Manual Control (Local Switch) (C405.2.2.3)
- Lighting Reduction (C405.2.2.2)

SEQUENCE OF OPERATION:
Fixtures:
- All fixtures are dimmable
- All fixtures are controlled together (per room)
- Maximum level can be task tuned to any percentage during startup

Occupancy Control:
- Fixtures automatically go to full bright when occupied
- Fixtures automatically turn off when room becomes vacant

Manual Control:
- On/off & raise/lower control of fixtures (per room)
- If switch poses safety concerns, optionally can be programmed for "on only"

ADDITIONAL OPTIONS
- Echo Dual Tech sensors are available in wall-, ceiling-, and switch-mount options
- Unison Echo supports seamless connection to Paradigm control systems for facility-wide control and monitoring (Enhanced Digital Lighting Controls, C406.4)
- Time-based control to meet section C405.2.2.1 – Time-Switch Controls, available via TimeClock. (See pg. 15 for more info.)
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<td>3</td>
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<td>ERMC4</td>
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PROGRAMMABLE TIMECLOCK CONTROL

Although not included in each of the room design risers, every Echo Zone can be controlled with a TimeClock, assuring your system meets the IECC Time-Switch Controls provision (C405.2.2.1), and also qualifies for the Enhanced Digital Lighting Controls provision (C406.4). The Echo TimeClock offers time-of-day and astronomical control as well as manual control via hold, override and event-recurrence modes, like “everyday,” “weekday,” “weekend,” and “daily,” as well as fully-configurable Daylight Saving Time, holiday schedules and special-event override.

ECHOACCESS™ APP

EchoAccess releases the full potential of your Echo system, offering custom control and configuration from an iOS or Android™ smartphone. The app connects to your Echo network via a Bluetooth connection with the EchoAccess interface.

In the app, users can set lighting levels, combine spaces, and control zones directly – as well as record, activate and deactivate presets, plus much more. Add an Echo DMX Scene Controller to your system, and the EchoAccess app can adjust DMX-controlled luminaires’ hue, saturation, and intensity.

EchoAccess connects to any Echo system via the simple, two-wire Echo bus, and melds neatly in your design using the same stylish Inspire® faceplates.
CEILING- AND WALL-MOUNT DUAL TECH OCCUPANCY/VACANCY SENSOR

- Passive Infrared and Acoustic Detection technologies
- Occupancy and Vacancy detection options
- Ceiling-mount, small-room, large-room, and high-ceiling options available. Wall-mount wide and narrow coverage available
- Thirty-second grace timer
- Walk test function for PIR and acoustic coverage
- Supports small motion detection up to 45ft
- Up to 2,000-square-foot coverage
- Available in Black and White finishes

CEILING-MOUNT PIR OCCUPANCY AND VACANCY SENSOR

- Occupancy and Vacancy sensor options
- Small-room, large-room, and high-ceiling options available
- Passive Infrared (PIR) detection
- Thirty-second grace timer
- Walk test function
- Available in Black or White

SWITCH-MOUNT DUAL TECH OCCUPANCY SENSOR

- Passive Infrared and Acoustic Detection technologies
- One- and two-button options available
- Thirty-second grace timer
- Walk test function for PIR and acoustic coverage
- Supports small motion detection up to 45ft
- Cream, Gray, Black or White finish
ECHO RELAY PANEL MAINS FEED
The Echo Relay Panel Mains Feed features relay and line dimming control, switching with integral breakers, and options for low-voltage control. Its built-in power supply supports up to six stations and power controllers.

- Supports 10A, 15A, or 20A breakers
- 28 circuit panel with support for 24 relays/ dimmers and 4 hot circuits
- 20A mechanically-held air-gap relays
- Optional 300-watt dimmer available per circuit
- Optional 0-10V or DALI output
- Optional network interface
- Astronomical and Real-time clock

ECHO RELAY PANEL FEEDTHROUGH
The Echo Relay Panel Feedthrough offers creative power distribution for all load types with relay switching for multiple voltages in a single panel. Its built-in power supply supports up to six stations and power controllers.

- 120V and 277V power control
- Up to 48 relay outputs
- Optional 0-10V or DALI output
- Astronomical and Real-time clock

SENSOR IQ INTELLIGENT BREAKER PANEL
The Sensor IQ Intelligent Breaker Panel is a 120V mains-fed power panel that provides switching, 0-10V dimming, and DALI control for stage and houselight systems.

- Relay control for one-, two-, and three-pole circuits
- Supports 15- and 30-amp breakers
- 12, 24, or 48 circuits panel options
- Direct connection for up to six Zone and Room Controllers and six Inspire Stations or Responsive Controls
- 120V or 277V options available
- Astronomical and Real-time clock
## APPENDIX: Requirements Overview

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<th>Control Requirement</th>
<th>Code Provision</th>
<th>Code Summary</th>
<th>Recommendations for Compliance</th>
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<tr>
<td><strong>On-Off Control</strong></td>
<td></td>
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<tr>
<td>Automatic Full-Off via Sensor</td>
<td>C405.2.1.1.1</td>
<td>Spaces vacant for more than 30 minutes (maximum) require automatic shut off of lighting via occupancy or vacancy sensor.</td>
<td>Use vacancy sensors in all spaces.</td>
</tr>
<tr>
<td>Automatic Partial-Off via Sensor</td>
<td>C405.2.1.1.2</td>
<td>Spaces vacant for more than 30 minutes (maximum) require automatic reduction of power consumption by at least 50%.</td>
<td>Use sensors in all designs and sensors in all applications with configuration to set dimmed fixtures to 50% on vacancy.</td>
</tr>
<tr>
<td>Programmable Timedock</td>
<td>C405.2.2.1</td>
<td>Areas of a building that do not utilize vacancy sensing require time-based controls and a minimum of one override switch.</td>
<td>TimeClocks maximize energy efficiency by supporting astronomical, real-time and manual control events across multiple spaces from a single device.</td>
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<tr>
<td><strong>Light Level Control</strong></td>
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<tr>
<td>Local Control</td>
<td>C405.2.2.3</td>
<td>All areas require a minimum on one manual control station that allows occupants to turn lighting off.</td>
<td>Include manual control stations in all enclosed spaces.</td>
</tr>
<tr>
<td>Light Reduction Controls</td>
<td>C405.2.2.2</td>
<td>Spaces require manual controls allowing an occupant to reduce lighting loads uniformly by a minimum of 50%.</td>
<td>Include continuously dimmable LED fixtures and manual dimming controls.</td>
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<tr>
<td>Daylight Responsive Controls</td>
<td>C405.2.3.1/2</td>
<td>Daylight controls are required in all spaces with sidelight and top light daylight zones.</td>
<td>Use light sensors and continuously dimmable fixtures in all daylight spaces.</td>
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</table>
### ETC Product Solutions

<table>
<thead>
<tr>
<th>Vacancy Sensors</th>
<th>Dual Tech Vacancy Sensors</th>
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<tr>
<td>Vacancy Sensors use passive infrared detection to ensure lights automatically turn off when a space is empty, in areas up to 2,000 square feet.</td>
<td>Dual Tech Sensors couple passive infrared (PIR) detection with acoustic detection to insure a space is empty before turning off lights. Dual Tech Sensors offer ceiling-, wall-, or switch-mount installation.</td>
</tr>
</tbody>
</table>

### TimeClock

Echo TimeClock features an intuitive six-button interface and large backlit display that allow for simple set-it-and-forget-it operation. In addition to time based events, manual control via hold, override and event-recurrence modes, like "everyday," "weekday," "weekend," and "daily," as well as fully-configurable Daylight Saving Time, holiday schedules, and special-event override make the TimeClock station adaptable to any application.

### Inspire Control Stations

Inspire stations can be easily programmed for preset lighting looks and offer the capability of setting zone- and space-combine functions. They can be installed anywhere they’re needed throughout a space, for maximum convenience.

### Preset Stations

Unison Echo Preset Stations - available in two sizes and a variety of colors - provide easy access to lighting scenes with just the simple touch of a button.

### Phase-Adaptive Dimmer

The Echo Phase-Adaptive Dimmer provides reverse- or forward-phase dimming for loads up to 600 watts. It is compatible with all Echo control products, including daylight and occupancy sensors and manual control stations, providing flexibility and energy savings.

### Relay Controller w/ 0-10V dimming

Unison Echo 0-10V Dimming Controllers offer fully-rated 20-amp relays coupled with 0-10V dimming for direct control of compatible LED drivers and fluorescent dimming ballasts. Controllers are available for single- or dual-zone configurations, allowing for added flexibility in your installation.

### Unison Echo Light Sensor

Unison Echo Light Sensors are able to detect and measure the amount of natural light in an area, and raise or lower the output of lighting fixtures accordingly, to maintain a consistent lighting level. Echo Light Sensors have a single head option for interior, exterior, and atrium use. They also support two-sensor averaging, so if you have a large space, you can locate sensors in different locations to light the entire area evenly. The head of the Sensors can be detached and located apart from the controller, allowing you the most flexibility for your venue.
ADDITIONAL RESOURCES

IECC
http://www.iccsafe.org

Use the following sections of the IESS 2018 code as reference:
Section C405.2.1.1.1 – Full Auto-Off via Occupancy Sensor
Section C405.2.1.1.2 – Manual-On or Partial-On
Section C405.2.1.1.2 – Full Automatic On
Section C405.2.1.3 – Local Switch
Section C405.2.2.1 – Programmable Timeclock
Section C405.2.2.2 – Manual Lighting Reduction
Section C405.2.3.1/2 – Daylight-Responsive Controls
Section C406.4 – Enhanced Digital Lighting Controls