

# Motion Sensor Driver User's Guide

(Control4 Driver for Axxess Wall-Mount and Ceiling-Mount Motion Sensor Devices)



## Contents

Motion Sensor Driver User's Guide .....	1
Change Log .....	3
Properties .....	4
Actions .....	8
Events .....	9
Variables .....	10
C4 Programming Commands .....	11
Connections .....	12
Driver Setup Guide .....	13
Changing Device-Related Settings .....	13
Joining and Leaving.....	13
Extra Notes .....	14
Limitations .....	14
Contact .....	15

## [Change Log](#)

Rev 1.00 – Released August 10, 2020

[AP] – First revision, no changes to report.

## Properties

Some driver properties affect settings on the motion sensor device and some properties affect settings within the driver. For battery powered/sleepy devices, settings cannot be sent to the device until it communicates to the controller; in these cases, changing a property that is intended to affect the device will not cause the desired change immediately. For properties that are user-selectable, it will be indicated whether the setting affects the device or the driver.

### Device

When a motion sensor is identified, the driver will query the motion sensor for information on type, color, and power source, and this read-only property string will be populated with the queried information.

### Last Communication

This property will display the timestamp of the last time the motion sensor communicated to the driver.

### Motion Status

This property will display the current motion status of the motion sensor along with a timestamp showing the time of the event. Ex) MOTION DETECTED or MOTION ENDED.

### Update Properties (driver)

This property determines whether or not the driver will update properties that are meant to show current information.

### Show Advanced (driver)

Setting this property to 'Show' will show more properties pertaining to motion sensor setup and operation.

### Debug Mode (driver)

This property determines whether the driver will print debug information to the lua output window or not.

### Setup Mode (device)

This property, when set to **On**, will cause the motion sensor to echo motion detection events on one of the indicator LEDs on the face of the device. This is useful for setup to determine if the motion sensitivity and placement of the device meets the user's requirements.

### Invert Contact Output (driver)

This property determines whether the '**Motion**' connection/binding inverts the output or not. When set to False, the binding will output '**OPENED**' when the motion detector senses motion and outputs '**CLOSED**' when the motion detector's motion event ends. When this property is set to True. The binding outputs will be reversed.

### Motion Sensitivity (device)

This property will configure the motion sensor's detection threshold. The available values range from 0-12, where 0 configures the sensor with the highest threshold (lowest sensitivity) and 12 configures the sensor with the lowest threshold (highest sensitivity).

As the motion sensor is configured to become more sensitive, it will become more sensitive to size, speed, and distance of the detectable object.

### Occupancy Hold Time (device)

This property will configure the amount of time for which the motion sensor must detect no motion before determining the motion state to be inactive (sends a motion ended event to the driver).

## Relay Setup (device)

This property will only appear for motion sensor devices that have the appropriate hardware to expose a dry contact relay that can be used in various ways. The available options for this property are explained below:

**Normally Open:** The relay on the device can be controlled via C4 programming commands and assumes the open state upon power-up. If a **pulse relay** command is sent to the device, the relay will close for the specified amount of time and then open again.

**Normally Closed:** The relay on the device can be controlled via C4 programming commands and assumes the closed state upon power-up. If a **pulse relay** command is sent to the device, the relay will open for the specified amount of time and then close again.

**On Motion Detected Relay Open:** The relay is tied directly to the motion detection state and controlled by the device only. With this option selected, the relay will be open while the device is in a motion detected state, and will be closed otherwise.

**On Motion Detected Relay Closed:** The relay is tied directly to the motion detection state and controlled by the device only. With this option selected, the relay will be closed while the device is in a motion detected state, and will be open otherwise.

## Relay State

This is a read-only property that reflects the state of the motion sensor's relay.

## Light - Force Transmit % (device)

This property determines whether changes in ambient light level will force a status/update message to be sent to the driver by the device. This is useful when using the ambient light sensor value in C4 programming as it will ensure that the driver receives an updated ambient light value every time it changes. The available options for this property determine how large a light level change is required to cause the motion sensor to wake up and send an update to the driver. **Be aware that this option can cause increased battery consumption.**

## Temp - Force Transmit Deg (device)

This property follows the same premise as the **Light – Force Transmit** property above.. **Be aware that this option can cause increased battery consumption.**

## Humidity - Force Transmit % (device)

This property follows the same premise as the **Light – Force Transmit** property above.. **Be aware that this option can cause increased battery consumption.**

## Report Time (device)

This property determines how often the motion sensor will send a status update to the driver. The status update message includes all sensor data such as ambient light level, temperature, humidity, motion state, etc... Decreasing this value will cause increased battery consumption due to reporting more often.

## Continuous Motion Reporting (device & driver)

This property determines whether the motion sensor will send motion detected event messages to the driver while the device is currently in a motion detect state. When set to **On**, the motion sensor will report all motion detection events to the driver and the driver will fire the **Motion Detected** event with each incoming event. **Be aware that with this setting turned on, battery consumption will be increased.**

### Ignore Motion Reports (driver)

This property can be used to tell the driver to ignore motion detection events coming from the motion sensor. In the event that a motion detected/ended event is received by the driver, no events will be fired if this option is enabled.

### Motion in Day Mode (device)

This property determines whether the motion sensor will report motion detection events during the day as determined by the device's ambient light sensor and daytime detection settings.

### Motion in Night Mode (device)

This property determines whether the motion sensor will report motion detection events during the night as determined by the device's ambient light sensor and nighttime detection settings.

### Day/Night Mode

This read-only property displays the motion sensor's detected time be it day or night.

### Illumination %

This read-only property displays the motion sensor's detected ambient light level. This value is also made available as a C4 Variable that can be evented off. Note that black motion sensors measure lower illumination values in general due to the housing.

### Day Mode Level % & Day Mode Time (device)

These two properties are used together by the motion sensor to determine whether it is daytime. The motion sensor's measured illumination value must exceed the **Day Mode Level %** value for the amount of time defined by the **Day Mode Time** value before it decides that it is daytime.

### Night Mode Level % & Night Mode Time (device)

These two properties are used together by the motion sensor to determine whether it is nighttime. The motion sensor's measured illumination value must drop below the **Night Mode Level %** value for the amount of time defined by the **Night Mode Time** value before it decides that it is nighttime.

### Temperature

Read-only property to display the motion sensor's measured ambient temperature.

### Temperature Offset (driver)

This property defines an offset that can be applied to incoming temperature values if it is noticed that the motion sensor's temperature is off by a consistent amount.

### Temperature Scale (driver)

This property determines whether the **Temperature** property

### Relative Humidity %

Displays the humidity value measured by the motion sensor if a humidity sensor is installed.

### Battery State

Read-only property that displays the battery state. Potential battery state indicators are as follows:

**Good, Low, Critical, Dead.**

### Battery Voltage

Read-only property that displays the battery voltage as measured by the motion sensor.

### Battery Level (Low) (driver)

This is a user-configurable property that can be used to set the “low” level of the battery.

### Battery Level (Critical) (driver)

This is a user-configurable property that can be used to set the “critical” level of the battery.

### Communication Status

This read-only property is used to indicate to the user whether the driver believes the device is online, offline, or having troubles communicating.

### Firmware Version (Device)

This read-only property displays the version of firmware running on the motion sensor's microcontroller.

### Wireless Version (Device)

This read-only property displays the version of firmware running on the motion sensor's zigbee radio module.

### Firmware Update (Status)

This read-only property displays the current state of a firmware update if there is one active.

### Firmware Update (Start Time)

This read-only property displays the start time of the last firmware update if one has taken place or is currently active.

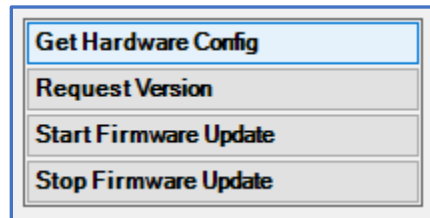
### Firmware Update (End Time)

This read-only property displays the end time of the last firmware update if one has taken place.

### Driver Version

This read-only property displays the version of the driver being used.

## Actions



### Get Hardware Config

Requests hardware configuration information from the connected motion sensor. Upon receipt of the hardware config message, the **Device** property described earlier will be populated based on the information received.

### Request Version

Requests the version of the zigbee radio module.

### Start Firmware Update

Begins updating firmware on the motion sensor if there is a firmware update file in the driver.

### Stop Firmware Update

Halts a firmware update if there is one active.



## Events

### Motion Detected

Fired when the motion sensor detects motion. If **Continuous Motion** is enabled, this event will be fired every time the device detects motion, otherwise this event will only fire once and will not fire again unless the motion event times out (no motion detected for the period defined by occupancy hold time).

### Motion Ended

Fired when the motion sensor is in a motion-detected state and has not detected motion for the period defined by the occupancy hold time.

### Battery is Low

Fired once when the driver receives three simultaneous battery voltage measurements below the specified low battery level. This event will not fire again unless the battery state changes from low to a different state and then back to low.

### Battery is Critical

Fired once when the driver receives three simultaneous battery voltage measurements below the specified critical battery level. This event will not fire again unless the battery state changes from critical to a different state and then back to critical.

### Light Change Forced Transmit

This event is fired if the motion sensor reports to the driver due to a change in illumination measured by the device. This event can only fire if the corresponding property (**Light - Force Transmit %**) is set to a value other than **Off**, otherwise the motion sensor will not report to the driver due to a change in illumination.

### Temperature Change Forced Transmit

This event is fired if the motion sensor reports to the driver due to a change in temperature measured by the device. This event can only fire if the corresponding property (**Temp - Force Transmit Deg**) is set to a value other than **Off**, otherwise the motion sensor will not report to the driver due to a change in temperature.

### Humidity Change Forced Transmit

This event is fired if the motion sensor reports to the driver due to a change in humidity measured by the device. This event can only fire if the corresponding property (**Humidity - Force Transmit %**) is set to a value other than **Off**, otherwise the motion sensor will not report to the driver due to a change in humidity.

### Day/Night Mode Change Forced Transmit

This event is fired if the motion sensor reports to the driver due to a change in day/night time as determined by the device.

### Device Starts Communicating

This event will fire when the Control4 system determines that the device's zigbee state has changed from **Offline** to **Online**.

### Device Stops Communicating

This event will fire when the Control4 system determines that the device's zigbee state has changed from **Online** to **Offline**.

## Variables

### Battery Voltage

Mirrors the **Battery Voltage** property field value.

### Device Type

Mirrors the **Device** property field string.

### Illumination %

Mirrors the **Illumination %** property field value.

### Microcontroller Version

Mirrors the **Firmware Version (Device)** property field value.

### Motion Detected

Boolean value that mirrors the current motion detection state. **True** denotes an active motion event. **False** implies that there is no active motion event.

### Motion Detected Time

String value that stores the time of the most recent motion detection event in the format: '**H:M:S**'.

### Motion Ended Time

String value that stores the time of the most recent motion end event in the format: '**H:M:S**'.

### Night Mode

Boolean value that mirrors the current state of the motion sensor's day/night value. **True** implies that the motion sensor is in **Night Mode**. **False** implies that the motion sensor is in **Day Mode**.

### Occupancy Hold Time

Mirrors the **Occupancy Hold Time** property field value.

### Relative Humidity

Mirrors the **Relative Humidity** property field value.

### Report Time

Mirrors the **Report Time** property field value.

### Temperature

Mirrors the **Temperature** property field value in the desired temperature scale.

### Wireless Version (Driver) - **Deprecated**

Reflects the version of the firmware file stored in the driver to be used to update the device if one exists.

## C4 Programming Commands

### Motion Sensitivity

This command is used to set motion sensitivity programmatically in the case that the motion detection behavior should change based on some external event or parameter change.

### Occupancy Hold Time

This command is used to set the occupancy hold time programmatically in the case that the motion detection timeout length should change based on some external event or parameter change.

### Report Time

This command is used to set the motion sensor's report interval programmatically. An example of where this might be used would be increasing the length of the report time as the motion sensor's battery level gets lower.

### Ignore Motion Reports

This command is used to programmatically set the property that determines whether the driver ignores motion detection events.

### Motion In Day Mode

This command is used to set whether the motion sensor senses motion while in day mode.

### Motion In Night Mode

This command is used to set whether the motion sensor senses motion while in night mode.

### Setup Mode

This command is used to enable setup mode on the motion sensor programmatically. The likelihood of this command being used is low, admittedly, but may find use in some corner conditions.

### Set Relay State

This command is used to set the state of the relay output on the motion sensor if it has this feature.

### Pulse Relay

This command is used to pulse the relay output on the motion sensor for a specified amount of time if it has this feature.

### Toggle Relay

This command is used to toggle the state of the relay output on the motion sensor if it has this feature.

## Connections

### Motion

#### Connection Type = CONTACT\_SENSOR

This connection is based on Control4's recommended implementation of a **CONTACT\_SENSOR** output connection meant to indicate motion events to other drivers/devices. When the motion sensor detects a motion event, the **CONTACT\_SENSOR** connection will output an '**OPENED**' value; when the motion sensor detection event ends (after the occupancy hold timer expires), the connection will output a '**CLOSED**' value. If the '**Invert Contact Output**' property is set to **True**, those output values will be flipped.

### Humidity

#### Connection Type = HUMIDITY\_VALUE

This connection is based on Control4's recommended implementation of a **HUMIDITY\_VALUE** output connection. This can be connected to thermostat drivers or thermostat display drivers.

### Temperature

#### Connection Type = TEMPERATURE\_VALUE

This connection is based on Control4's recommended implementation of a **TEMPERATURE\_VALUE** output connection. This can be connected to thermostat drivers or thermostat display drivers.

### Ambient Light Sensor Link

#### Connection Type = AMBIENT\_LIGHT\_LINK

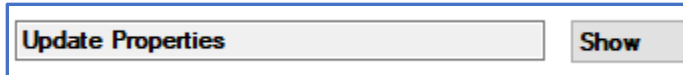
This connection is proprietary to Axxess Industries and is only compatible with Axxess Keypad devices. The motion sensor's ambient light measurement can be used as an ambient light measurement meant to drive one or more Axxess Keypads' backlight behaviors based on room light levels.

## Driver Setup Guide

### Changing Device-Related Settings

The driver setting defaults allow the motion sensor to be useable by the dealer right out of the box. However, to ensure that any changes in the driver settings get transferred to the device successfully, please follow these steps:

- 1) Add driver to project in Composer.
- 2) Change the **Update Properties** field to **Show**:

A screenshot of a software interface showing a dropdown menu. The dropdown is open, and the word 'Show' is selected and highlighted in a light blue box. The text 'Update Properties' is visible to the left of the dropdown.

- 3) Join motion sensor device to driver. Return to driver **Properties** page and wait for the **Motion Status** property field to change to **MOTION ENDED**.
- 4) Changed the property settings that will affect the motion sensor (as noted in the **Properties** section above in this document). Ex) **Report Time**, **Occupancy Hold Time**, **Motion Sensitivity**. The driver will be ready to send these new settings values to the motion sensor next time it communicates to the driver/controller.
- 5) Activate the motion sensor by causing a motion detection event (wave your hand in front of it); the **Motion Status** property will change to **MOTION DETECTED**.
- 6) When the motion sensor's current motion detection event ends, the new settings will be applied.

**NOTE:** Motion Sensors that are battery powered will always be sleepy end-node devices. This means that the driver/controller cannot communicate to them unless they wake up on their own. Therefore, if the user sets the **Report Time** and **Occupancy Hold Time** to max values, and no other settings are enabled such that the motion sensor will not wake up for any other reason than a motion event change or report timer expiry, it may take some time before new settings can be sent to the device. The quickest way to get the device to communicate to the controller in this case is to perform a join sequence (4-tap) on the device's network button.

### Joining and Leaving

The join/leave tap sequences and network button locations can be found in the user guide that is included in the motion sensor's packaging. The sequences are also listed below:

#### Join:

4 taps on the network button.

Green network LED will flash while searching for a coordinator, then go solid for 4 seconds to indicate a successful join.

#### Leave:

13 taps on the network button.

Green network LED will flash 8 times to indicate that it has left the network.

The motion sensor will also display its current network state upon power-up by flashing the network LED as described above.

## Extra Notes

### Limitations

#### Temperature Interference

The Axxess motion sensor devices (ceiling mount and wall mount) function using PIR (passive infrared) sensors which detect body heat emitted in the form of IR. This works fine in most scenarios, however, it has been found that in certain cases the ambient temperature in the area where the motion sensor is placed can affect the motion detection capabilities of the device. These cases are usually a result of the sensor pointing at a surface which often has a temperature similar to that of a human body. For example: a wall that is bathed in sunlight can get quite warm, and if the motion sensor is pointed such that the wall takes up the majority of its field-of-view, human movements can get washed out because the heat/IR emitted from the body might be of similar intensity. This would result in diminished motion detection. Due to the mode of operation of these devices, it is also advised that the dealer be aware of environments that experience large and sudden temperature differentials as these could cause errant motion detection events.

#### Motion, Not Presence

One misconception about motion sensors is that they should be able to detect when someone is in a room if the device is pointing at them. Most motion sensors are intended to detect moving objects that have a heat signature as described above. This means that if objects are not moving, the device cannot detect that there is an object there. So, when relying solely on a motion sensor to control the lights in a room, the dealer should be aware that the motion detection will time out if the clients remain very still for the duration of the occupancy hold time period.

#### Illumination Values vs Case Color

It is worth noting that the illumination values measured by the ambient light sensor on these motion sensors varies based on the case color. More light can penetrate white cases; less light is able to penetrate black cases. Therefore, the range of the light sensor is diminished when the sensor is in a black case. This should be considered when deciding on case color if the illumination measurement is important for the end user.

#### Day/Night Determination

The motion sensor is typically used indoors as it is not a waterproofed device; due to this, the dealer must account for the fact that the lighting in the room that the motion sensor is installed will affect the device's ability to determine whether it is day or night. Realistically, the motion sensor is determining whether the room it is in has been dark or light for a specified amount of time and the dealer can decide whether they want to enable motion detection based on that premise.

## Contact

For technical questions and concerns, please contact [integration@axxind.com](mailto:integration@axxind.com)

For sales, RMA, and general information, please contact [residential@axxind.com](mailto:residential@axxind.com)