

Zigbee IO

Installation Guide



Package contents

- C4-Z2IO Zigbee IO
- Four wall mounting screws
- Four plastic dry wall anchors
- Two IR emitters
- Micro USB power supply

Requirements

- Composer Pro 2.10.0 or higher

Features

Create a stronger, wider, and more robust Zigbee mesh network than ever before using the Zigbee IO. Eliminate any network “dead spots” by increasing the reach and density of your Zigbee mesh. Improve Zigbee signal latency and provide your customers with higher reliability and responsiveness as they use the devices connected to their Zigbee mesh network.

The Zigbee IO (Z2IO) is a single device that combines the features of:

- Remote relays (up to two)
- Remote contact sensors (up to four)
- Remote thermistors (two)
- Internal contact (internal magnetic reed switch)
- Zigbee-to-IR converters

Any of these inputs can be used to trigger and control automated events—such as sending an e-mail or turning on a cabinet light when its door is opened—throughout the Control4 system.

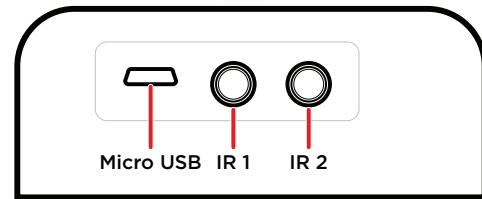
With this device, you can reduce the need to run control wires over long distances (or where you can’t run any wires at all).

As Zigbee to IR

The two 3.5 mm IR ports allow you to connect up to two standard IR emitters to control any IR-controlled devices, such as TVs, DVRs, and receivers.

When connecting IR emitters, make note of which port each emitter is connected to (labeled “1” and “2”).

IR codes sent from the controller to the Zigbee IO are cached at the device, resulting in faster IR control response times.



Note: Y IR cables can be used, or IR cables can be spliced together (in parallel, not in series), to increase the number of controlled devices. Be aware that these connected emitters cannot be controlled independently but will all fire simultaneously from the shared IR port. Test to verify that there is no crossover code functionality between devices sharing the same IR port to avoid unwanted side effects.

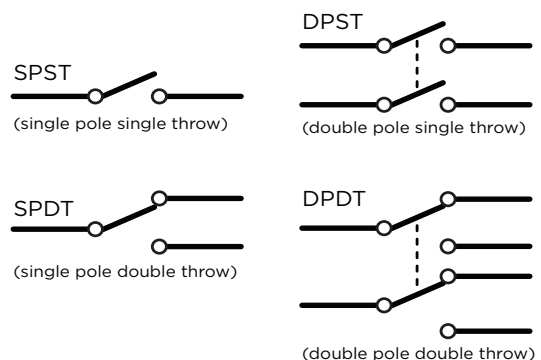
As a contact and relay

The device has an internal contact along one edge that can be used to detect open or closed states when installed with a mounted magnet. Up to four contacts (besides the internal contact) or two additional relays, or a combination of the two, can be used. Each option is outlined below in “Contact and Relay Wiring Options,” and after it’s physically wired, the correct option must be set on the *Properties* tab as outline further below in the section “IO Options.”

As a relay

As a relay, this device provides wireless control of garage door openers, window coverings, fireplaces, and pumps (along with other relay control applications) inside or outside the home. It integrates into Control4 systems as standard relays that can be opened, closed, toggled, or pulsed.

The relay enables wireless control of any device controllable by one or two low-voltage SPST relays or one simulated SPDT/DPDT relay. These functions appear in a Control4 system as relay outputs (relays) in Composer Pro.



As a contact sensor

Depending on the selected IO configuration, up to four external contacts are possible. As a contact sensor, this device allows wireless monitoring of garage doors, gates, windows, mailboxes, doorbells, and pool or spa covers (along with other contact sensor monitoring applications you integrate or devise). These functions appear in a Control4 system as contact sensor inputs, which can trigger home automation events.

The internal contact is a magnetic reed switch. To use this internal contact, the Z2IO should be mounted so that the indentation (along the same edge as the identify button) comes in close proximity to a mounted magnet (not included) in a fully closed state (door is closed). When the door opens, the magnetic connection is lost, and that state change is pushed to the system.

Contact and relay wiring options

There are five wiring options for contacts and relays. After they are physically wired (as explained below), the correct option must be manually selected on the *Properties* tab using the *IO Properties* drop-down box.

		Pins							
		PWR	Cm	T	C4	C3	Cm	C2	C1
Options	1				R2 (SPST)	R2 (SPST)		R1 (SPST)	R1 (SPST)
	2				C4	C3		C2	C1
	3	+	Cm	T	C2	C1	Cm	R1 (SPST)	R1 (SPST)
	4				R2 (SPDT)	R2 (SPDT)		R1 (SPDT)	R1 (SPDT)
	5				R2 (DPST)	R2 (DPST)		R1 (DPST)	R1 (DPST)

R# = Relay, C# = Contact, Cm = Common ground (-), T = Thermistor,
SPST = Single pole single throw, SPDT = Single pole double throw,
DPST = Double pole single throw

Option 1: Two Relays using R1, R2—Two independent, single pole single throw (SPST) relays. Each relay controls a single circuit.

- Relay 1 is wired to pins C1 and pin C2.
- Relay 2 is wired to pins C3 and pin C4

Option 2: Four Contacts using C1, C2, C3, C4—Four independently sensed circuits.

- Contact 1 is wired to pin C1 and pin Cm (Common).
- Contact 2 is wired to pin C2 and pin Cm (Common).
- Contact 3 is wired to pin C3 and pin Cm (Common).
- Contact 4 is wired to pin C4 and pin Cm (Common)

Option 3: One Relay (SPST) and Two Contacts using R1 and C1, C2.

- Relay 1 is wired to pin C1 and pin C2.
- Contact 1 is wired to pin C3 and pin Cm (Common).
- Contact 2 is wired to pin C4 and pin Cm (Common).

Option 4: One Relay using R1 and R2 (SPDT)—The two relays operate together to simulate a single SPDT (single pole double throw) relay. However, unlike a true SPDT relay, both relays will open during a power failure.

- Relay 1 is wired to pin C1 and pin C2.
- Relay 2 is wired to pin C3 and pin C4.

Option 5: One Relay using R1 and R2 (DPST)—The two relays operate together to simulate a single DPST (double pole single throw configuration) relay. However, unlike a true DPST relay, both relays will open during a power failure.

- Relay 1 is wired to pin C1 and pin C2.
- Relay 2 is wired to pin C3 and pin C4.

As a thermistor and humidistat

The device contains an integrated thermistor and humidistat, as well as a connection for an external thermistor, allowing it to be used almost anywhere to report environmental conditions or to inform the climate control system. The thermistor senses temperatures from 32°F to 104°F (0°C to 40°C), and the humidistat senses humidity from 5% to 90%. The device checks the temperature and humidity every five seconds. If the temperature has changed more than 0.5°F (0.28°C), the device reports the new temperature. If the humidity has changed more than 0.5%, the device reports the new humidity percentage.

Data from the integrated thermistor and humidistat is always available, regardless of the selected IO configuration.



Notes:

- The humidity and internal and external temperature outputs can be connected (bound) to the Control4 Wireless Thermostat by Aprilaire (C4-THERM).
- A value of -40° in the Remote Temperature field could indicate either a negative temperature or that no remote thermistor is connected.
- The integrated humidistat will return a zero value after the device is rebooted until the actual humidity value can be reported.
- To display the temperature and/or humidity in Navigator, add the "Temperature Display Driver (OS 2.10+)" to the project and connect the driver's temperature driver to the Z2IO.
- Given the variations in temperature and humidity measurements and environments, it may be necessary to independently test and verify the local and remote temperature and humidity. The properties *Local Temperature Offset*, *Remote Temperature Offset*, and *Local Humidity Offset* can be used for this purpose.

Important safety instructions



Caution! You should install this device in accordance with all national and local electrical codes.



Caution! Improper use or installation of this device can result in loss of and damage to property.



Important: This product is not intended for direct connections to AC mains (120V/220V). Refer to the specifications.



Important: You must operate this device in accordance with the instructions and specifications in this installation guide.



Important: Using this product in any manner other than outlined in this document voids your warranty. Also, Control4 is *not* responsible or otherwise liable in any way for any damage resulting from the misuse of this product. See ctrl4.co/warranty for details.

Specifications

Model numbers	C4-Z2IO (single) C4-Z2IO-5PK (5-pack)
System requirements	
Control4 OS system requirements	OS version 2.10.0 or greater
Control4 system integration	Each installed Zigbee IO adds sensor and input connections to the Composer project.
Driver	The Zigbee IO (C4-Z2IO) is available in the Composer Online Driver Database.
Communication	
Networks supported	Control4 Zigbee Pro mesh networking protocol, based on the IEEE 802.15.4 Zigbee standard
Zigbee data rate	250 kbps
Zigbee frequency range	2.405 - 2.475 GHz
Connections	
Contact sensor input	4 inputs, accepts AWG 16-28, common ground connection.
Relay terminal ratings	0.5A @ 50V, 1A @ 24V or less
External thermistor	1 thermistor input, sold separately. See "Accessories"
Infrared	Two 3.5 mm IR ports
Integrated features	
Internal contact	Internal magnetic reed switch Requires external magnet, sold separately
Integrated internal thermistor	Internal thermistor can be used for local temperature sensing: 0 to 40 °C (32 to 104 °F)
Integrated humidistat	Can measure local humidity from 5% to 90%.
Power	
Power consumption	100mA at 12V, fully active
External low-voltage power supply	Micro USB power supply (included) AC/DC 5-24V (optional)
Other	
Available colors	Black (water-based paintable enclosure)
Dimensions (L × W × H)	78.7 × 65.7 × 26.6 mm (3.1 × 2.6 × 1.05")
Weight	70.9 grams (2.5 oz.)
Environmental	Temperature: Operational 0 to 40 °C (32 to 104 °F) Storage -29 to 70 °C (-20 to 158 °F) Humidity 5% to 95% non-condensing This device is <i>not</i> waterproof and must be kept out of direct contact with water. The product must <i>not</i> be immersed.
Paintable enclosure	The cover assembly plastics are paintable with any water-based residential paints. <i>Do not clog the cover assembly vent holes with paint.</i>
Accessories	
External thermistor	ZCA-EXT10A, AC-DOTS1-W, AC-PMT51-W

Installing

1 Place the device in a location which ensures the following:

- Easy access to any externally-connected wires
- Zigbee mesh networking efficiency



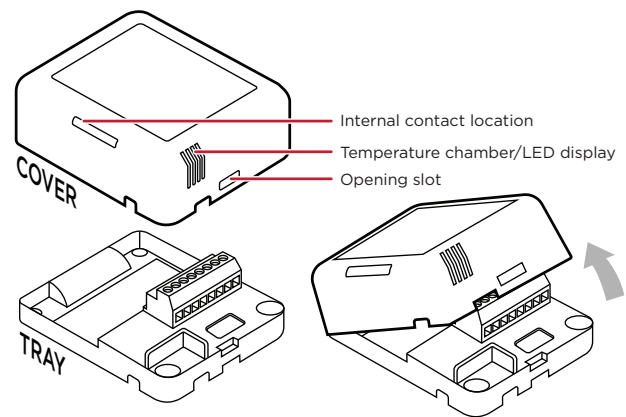
Note: Make sure the device has good Zigbee wireless reception by (1) ensuring it is within range of another Zigbee device and (2) avoiding other electrical equipment that may cause interference with the Zigbee signal (such as cordless telephones that operate on the 2.4 GHz frequency.)

- Avoiding unnecessary exposure to extreme environmental conditions.



IMPORTANT! Do not place the device in direct sunlight.

- If an external thermistor is used with the device, place it away from direct sunlight, drafts, doorways, skylights, windows, and exterior walls for best accuracy.
- Detach the tray from the cover by inserting a flat screwdriver into the opening slot in the side of the cover and pushing in gently, while at the same time pulling the cover out and away from the tray.

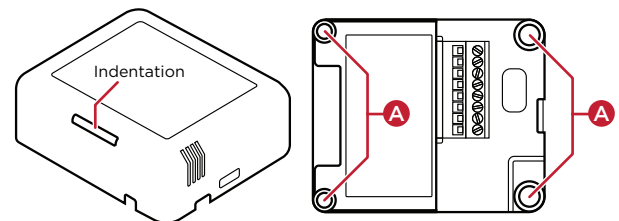


The cover holds the radio logic board (the actual device) and pins and the internal contact. The cover attaches to the tray. The tray holds the wiring terminals and is mounted to a wall or flat surface.

The cover "rocks" into contact with the tray. To separate the two, insert a screwdriver or other flat object into the opening slot on the side of the cover, gently push in and then "rock" it away from the tray.

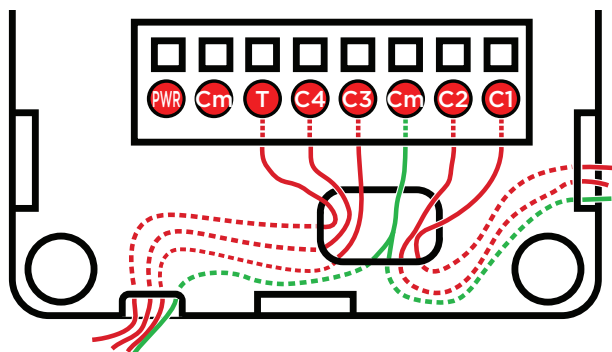
4 Position the tray against the wall or other flat surface.

5 If you are using the internal contact, position the device so that the narrow indentation that marks the internal contact (on the long edge of the cover) aligns with the external relay magnet (not included).



6 Mark the locations of the four screw holes on the wall.

- 7 If mounting the device to drywall, remove the tray from the wall and drill four 3/16-inch (4.75 mm) mounting holes at the four screw hole locations (A) previously marked on the wall.
- 8 Thread any relay wires, contact wires, and external thermistor wires from the wall through the openings in the tray and to the terminal block.



Note: The two *Cm* (common/ground) pins are connected and can be used interchangeably.

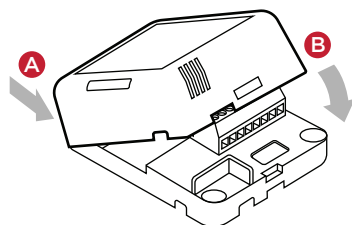
- 9 Insert and tighten the mounting screws.

Note: You may optionally choose to use robust two-sided tape to mount the tray assembly to the wall or other flat surface, as long as the tape won't prevent the back of the tray from sitting flush against the mounting surface.

- 10 Connect the wires from the tray to the terminals in the cover, matching the proper wires to the target terminal locations. The pin/terminal definitions are defined within Composer Pro. See "Configuring" on the next page. (Pins *Cm* and *PWR* are used for optional external power connections.)

Important! When using multiple external contact sensors, or when using an external contact sensor along with an external thermistor, you **MUST** connect each device to one of the *Cm* pins in addition to the appropriate sensor or thermistor pin to make a proper wiring connection. See the "Sample wiring configurations" section of this document for examples.

- 11 Attach the cover assembly to the tray:



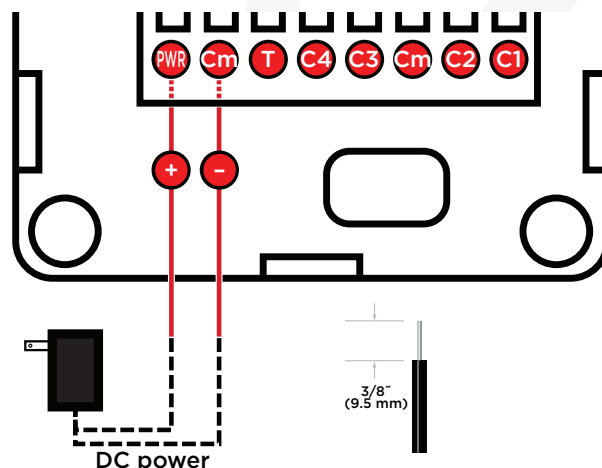
A. Align the cover edge's two latching tabs with corresponding tab receivers on the tray's edge.

B. Close the cover by rocking it toward the other end of the tray until it snaps into place with the tray.

- 12 For Zigbee to IR, connect any IR emitters to the two IR ports, then affix the emitter head to the IR window on the device to control (such as a TV).

Connecting alternate DC power

Although a power adapter is included, you may elect to instead connect an alternate 5-24V DC or AC power source to pins **Cm-PWR**. Connect DC positive polarity to pin **PWR**, and negative to pin **Cm**.



Configuring

Connections

Static connections

Some connections in the driver are static in that they are always available regardless of any settings/options. These include the two IR connections, IR Output 1 and IR Output 2, and the internal contact.

Dynamic connections

Other connections in the driver are dynamic in that the connections will appear based on certain options—in particular, the *IO Options* property. *If you change to another IO option, any connections created in the original IO option will be broken.*

To configure your device:

- 1 Add the device to your Composer Pro project. When prompted to identify the device, press the ID button on the face of the cover four times. The green LED blinks twice to confirm the ID has been sent to the Control4 system.
- OR -
In Composer Express, add a device into the project, scan for Zigbee devices, then press the ID button on the face of the cover four times.
- 2 In the driver's *Properties* tab, view or configure the settings explained below under "Properties," then click **Set** to the right of the setting after each change.
- 3 Configure each relay's power up state. This is the state you want the relay to adopt after a device reboot. For example, after a power outage (resulting in a device reboot), you may want the garage door to default to closed, the window coverings to be restored to their last known state, and the fireplace to be turned off.



Tip: Two SPST relays can optionally be linked to simulate a single SPDT relay. However, unlike a true SPDT relay, both relays will open during a power failure.

- 4 Add generic contact drivers (such as **Door Contact Sensor**, **Gate**, and **Motion Sensor**) and relay drivers (such as **Blinds**, **Door Lock**, and **Pump**) in *System Design* view, then connect the generic driver to the appropriate connection on the C4-Z2IO device in *Connections* view.
- 5 For programming, use these events:
 - **Online:** Triggers when the device comes online.
 - **Offline:** Triggers when the device goes offline.
 - **Reboot:** Triggers when the device reboots.

Properties

General properties

- **Log Level:** Standard for most drivers, this property allows you to filter which message types display in the *Lua Output* window. Options 0 - 5 correspond to Fatal through Trace levels, increasing in level of verbosity. Options are 0=Fatal, 1=Error, 2=Warning, 3=Info, 4=Debug, and 5=Trace. Default is 1 - *Error*.
- **Log Mode:** Activates logging of diagnostic information. The log level is set in the above property. Options include *Off*, *Print* (to the window), *Log* (to the Director Log), and *Print and Log* (both). Default is *Off*.
- **Driver Version:** (Read only) Shows the version number of the driver currently in use.
- **Device Status:** (Read only) Shows the current status of the product, whether online or offline. However, in some cases, the device may not report its status immediately, such as when the device is rebooting.
- **Firmware Version:** (Read only) Shows the version number of the firmware currently in use on the device. The firmware will be updated automatically over the air when the Control4 OS is updated and when that update includes a new firmware version for this device.
- **Bootloader Version:** (Read only) Shows the version number of the firmware currently in use on the device. The bootloader can only be updated by Control4, so this property is for support/diagnostic information only.
- **LED Mode:** Determines the behavior of the LED light on the top/front of the product. Options include *Off*, *Zigbee* (which shows the Zigbee status; see "Identification and Button Presses" below), and *IR* (which shows activity when IR signals are sent to the IR ports). Default is *Off*. When the property is set to *Off*, button presses should still temporarily prompt the LED to show the status.

Humidity properties

- **Local Humidity:** (Read only) Shows the relative humidity measured where the device is located. The value is shown as a percentage.
- **Local Humidity Offset:** The humidity sensor provides accuracy of +/- 4% relative humidity. Adjusting the *Local Humidity Offset* can result in increased inaccuracy of relative humidity reporting without using humidity calibration equipment for validation.

Temperature and humidity properties

- **Temperature Scale:** Sets which scale is used to calculate the temperature used in the *Local* and *Remote Temperature* properties described below, and affects only the *Properties* tab's settings. Options include *Fahrenheit* and *Celsius*. Default is *Fahrenheit*.

- **Local Temperature:** (Read only) Shows the most recent reported temperature recorded by the internal thermistor. The scale of the temperature is determined by the *Temperature Scale* property.
- **Local Temperature Offset**—Modifies the reported local temperature to account for environmental variances. The temperature can be changed downward or upward by a maximum of 20 degrees. The default is 0 (no correction).
- **Remote Temperature:** (Read only) Shows the most recent reported temperature recorded by the remote thermistor. The scale of the temperature is determined by the *Temperature Scale* property.
- **Remote Temperature Offset**—Modifies the reported remote temperature (the temperature recorded by an external thermistor) to account for environmental variances. (When multiple temperature sensors are located in the same room, you may notice each sensor shows a slightly different reading. This results from normal manufacturing variances in temperature sensors and the device's position/location in the room.) The temperature can be changed downward or upward by a maximum of 20 degrees. The default is 0 (no correction).
- **IO Options:** Tells the device how its eight configuration pins are assigned. The selected option is retained even after a system reboot or update.

IO properties

		Pins							
		PWR	Cm	T	R2		Cm	R1	
Options	1				R2 (SPST)	R2 (SPST)		R1 (SPST)	R1 (SPST)
	2				C4	C3		C2	C1
	3	+	Cm	T	C2	C1		R1 (SPST)	R1 (SPST)
	4				R2 (SPDT)	R2 (SPDT)		R1 (SPDT)	R1 (SPDT)
	5				R2 (DPST)	R2 (DPST)		R1 (DPST)	R1 (DPST)

R# = Relay, C# = Contact, Cm = Common ground (-), T = Thermistor, SPST = Single pole single throw, SPDT = Single pole double throw, DPST = Double pole single throw

- **Option 1: R1, R2 (both SPST [single pole single throw]):** (Default) Both relays are single pole single throw, meaning they are independent of each other; or, in other words, each relay controls only one circuit.
- **Option 2: C1, C2, C3, C4:** Four contacts.
- **Option 3: R1 (SPST), C1, C2:** One relay (single pole single throw) and two contacts.
- **Option 4: R1 (SPDT [single pole double throw]):** The two relays operate together to simulate a single SPDT (single pole double throw) relay. However, unlike a true SPDT relay, both relays will open during a power failure.
- **Option 5: R1 (DPST [double pole single throw]):** The two relays operate together to simulate a single DPST (double pole single throw configuration) relay.



Notes:

- The IR emitter control, internal contact, internal thermistor, and internal humidistat remain active regardless of the selected IO configuration.
- The selected IO option will change the available connections, so existing connections will be disconnected or deleted.
- The selected IO option determines the available fields in *Contact properties* and *Relay properties*.

Contact properties

- **Contact Internal Status:** (Read only) Shows the status of the static connection for the internal contact.
- **Contact 1-4 Status:** (Read only) Represents the status of the wired contacts if IO Option 1, 3, 4, or 5 is selected.

Relay properties

- **Relay 1 Power Up State and Relay 2 Power Up State:** (Read only) Represents the status of the relays if IO Option 1, 3, 4, or 5 is selected. The options are *Restore Last State*, *Set To OPEN*, and *Set To CLOSED*. The default is *Restore Last State*.
- **Relay 1 Status and Relay 2 Status:** (Read only) Represents the status of the relays if IO Option 1, 3, 4, or 5 is selected.

Actions tab

Buttons located on the *Actions* tab allow you to view version and diagnostic information and force relay actions. (Relay actions will always be shown, regardless of the IO configuration.)

- **Version Information:** This action button will display the versions of the driver's Base Template and Template, as well as the Boot Loader to the *Lua Output* window of the *Lua* tab. The *Log Mode* property does not have to be set to Print to display this information to the window.
- **Diagnostic Information:** This action button will display the following information to the *Lua Output* window of the *Lua* tab (the *Log Mode* property does not have to be set to Print to display this information to the window): device Zigbee MAC address, Zigbee mesh PAN id, Template Version, Base Template Version, Boot Loader Version, Zigbee Node ID.
- **Relay 1 Close and Relay 2 Close:** These action buttons will trigger the corresponding relay to close.
- **Relay 1 Open and Relay 2 Open:** These action buttons will trigger the corresponding relay to open.

Troubleshooting

If the device is not working:

- Reboot the device by disconnecting power, then re-connecting power.
- Check for proper wiring. See the "Wiring Configuration" diagrams.
- Review the log in the driver's Lua tab.
- Restore factory defaults (13 button presses).

Note: Un-identifying a device off the Zigbee mesh will cause it to do a factory reset. A factory reset reverts all relays to the open state, and the settings for Power Up State will revert to *Restore Last State*. The settings are preserved, however, after a power cycle or reboot.

LED diagnostics

The indicated statuses appear during device identification and when the ID button is pressed once.

LED	Description
 [Green] On	Offline/Waiting for Director
 [Yellow] Slow flashing	Scanning
 [Blue] On	Join success
 [Green] Fast flashing	Join success signal strength=good
 [Yellow] Fast flashing	Join success signal strength=adequate
 [Red] Fast flashing	Join success signal strength=risk/low
 [Red] Medium flashing	Join failed (then returns to offline)
 [Green] Slow flashing	Signal strength=good (from Network Tools)
 [Yellow] Slow flashing	Signal strength=adequate (from Network Tools)
 [Red] Slow flashing	Signal strength=risk/low (from Network Tools)

Button sequences

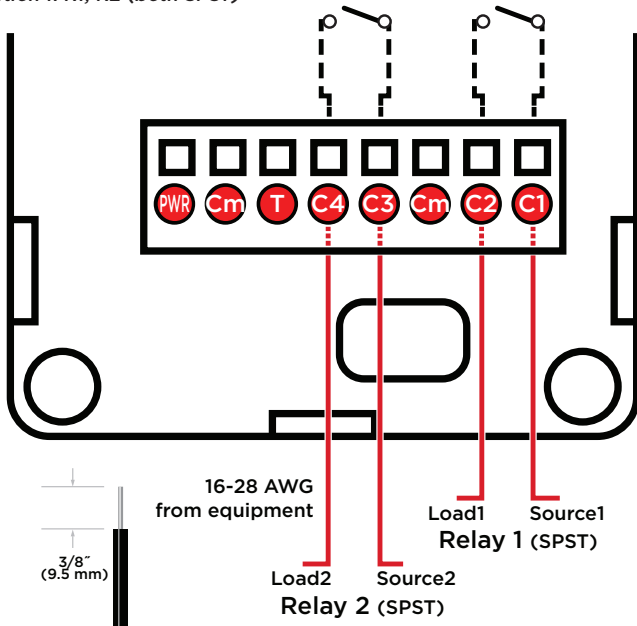
Functions	# of button presses
Identify	4
Reboot/Reset	15
Reset application defaults	9
Leave mesh, restore factory defaults	13
Signal strength flash LEDs	1

Restoring to previous firmware version

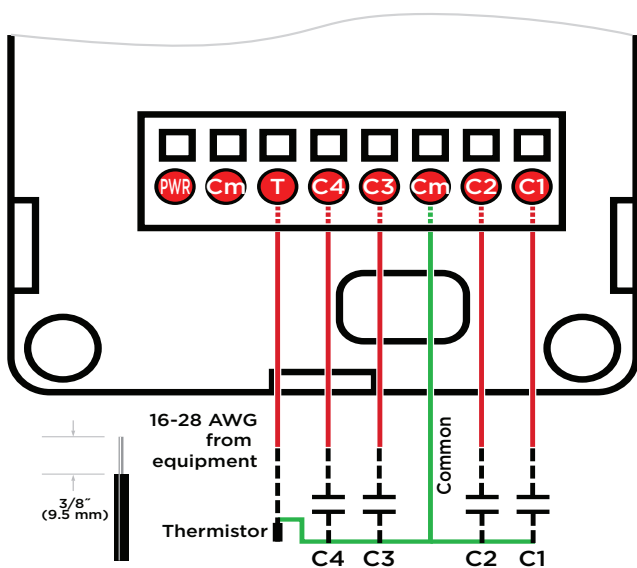
- 1 Power off the device (disconnect power).
- 2 While holding down the **ID** button, reconnect power, and continue to press the **ID** button until the LED changes from red to white (about five seconds).
- 3 Release the button. The device will reboot to its previous firmware version in about one minute.

Sample wiring configurations

Option 1: R1, R2 (both SPST)



Option 2: C1, C2, C3, C4 (including an optional external thermistor)



Additional resources

The following resources are available for additional support:

- Control4 Knowledgebase and forums
- Control4 Technical Support
- Control4 website: www.control4.com
- Composer documentation available at ctrl4.co/docs.

For the latest version of this document, open this URL or scan the QR code on a device that can view PDFs.



Regulatory/Safety information

To review Regulatory information for your particular Control4 products, see the information located on the Control4 website at ctrl4.co/reg.

Patent information

Applicable patents are available at ctrl4.co/patents.

Warranty

Visit ctrl4.co/warranty for details.